hp invent

hp jetdirect

175x
310x
380x
en3700

200m
250m
280m

610n
615n
620n
680n

administrator's guide

Administrator's Guide

HP Jetdirect Print Servers

Models:	175x	200m	610n
	310x	250m	615n
	380x	280m	620n
	en3700		680n

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Trademark Credits

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1

Introducing the HP Jetdirect Print Server

Introduction

HP Jetdirect print servers allow you to connect printers and other devices directly to a network. By attaching a device directly to a network, you can install it in a convenient location and share it with multiple users. In addition, a network connection allows data transfers to or from the device at network speeds.

HP Jetdirect internal print servers are installed in HP printers that have a compatible input/output (I/O) slot. HP Jetdirect external print servers connect printers to the network by adapting the printer's USB port to the network.

Note Unless otherwise specified, the term print server in this manual refers to the HP Jetdirect print servers and not a separate computer running print server software.

When connected through a wireless connection to your network, an HP Jetdirect wireless print server provides the same printing services as Jetdirect print servers connected by network cables. For more information on HP wireless print servers, see Appendix B.

Supported Print Servers

The features described in this guide support the following HP Jetdirect print servers with firmware versions specified:

Table 1.1 Supported Products

Model	Product Number	Printer Connect	Network Connect	Network Protocol Support	Firmware Version
175x	J6035C	USB 1.1	10/100TX	Limited*	M.25.xx series***
310x	J6038A	USB 1.1	10/100TX	Full**	Q.25.xx series
en3700	J7942A	USB 2.0	10/100TX	Full**	A.25.xx series
380x	J6061A	USB 1.1	802.11b Wireless	Full**	S.25.xx series
200m	J6039C	LIO slot	10/100TX	Limited*	P.25.xx series***
250m	J6042B	LIO slot	10/100TX	Full**	N.25.xx series
280m	J6044A	LIO slot	802.11b Wireless	Full**	T.25.xx series
610n	J4167A	EIO slot	Token Ring	Full (excludes AppleTalk)**	L.25.xx series
615n	J6057A	EIO slot	10/100TX	Full**	R.25.xx series
620n	J7934A	EIO slot	10/100TX	Full**	C.25.xx series
680n	J6058A	EIO slot	802.11b Wireless	Full**	U.25.xx series

* Limited support includes TCP/IP, IPX Direct Mode, AppleTalk (EtherTalk), LPD/Windows.

** Full support includes TCP/IP, IPX/SPX, AppleTalk (EtherTalk), LPR/LPD, Security. See Table 1.2.

*** **Not Upgradeable**. For feature upgrades, you must purchase a new product that contains updated firmware.

The installed firmware version can be identified using various methods, including the HP Jetdirect configuration page (see Chapter 9), Telnet (see Chapter 3), embedded Web server (see Chapter 4), and network management applications. For firmware updates, see "Firmware Upgrades".

Note When upgrading a supported print server, you may need to perform the upgrade twice if it contains a firmware version prior to X.24.00. This will be necessary if you want the print server to support management tools (for example, the embedded Web server) using non-English languages.

Supported Network Protocols

Note For HP Jetdirect wireless print servers, this section assumes that a wireless connection to your network has been established.

The supported network protocols, and popular network printing environments that use those protocols, are listed in Table 1.2.

Table 1.2 Supported Network Protocols (1 of 2)

Supported Network Protocols	Network Printing Environments*	Product Support
TCP/IP	Microsoft Windows 98/Me/NT4.0/2000/XP (32- and 64-bit), Direct Mode Novell NetWare 5, 6 using NDPS UNIX and Linux, including: Hewlett-Packard HP-UX, Sun Microsystems Solaris (SPARCsystems only), IBM AIX**, HP MPE-iX**, RedHat Linux, SuSE Linux LPR/LPD (Line Printer Daemon) IPP (Internet Printing Protocol) FTP (File Transfer Protocol)	J6035C (175x)*** J6038A (310x) J7942A (en3700) J6061A (380x) J6039C (200m)*** J6042B (250m) J6044A (280m) J4167A (610n) J6057A (615n) J7934A (620n) J6058A (680n)

* Refer to the current HP Jetdirect product data sheets for additional network systems and versions. For operation with other network environments, consult your system vendor or authorized HP dealer.

** For these network systems, contact your network system vendor for software, documentation, and support.

*** Windows IP/IPX Direct Mode printing and LPD/Windows supported. NetWare is not supported. IPP is not supported. LPD/UNIX is not supported.

Table 1.2 Supported Network Protocols (2 of 2)

Supported Network Protocols	Network Printing Environments*	Product Support
IPX/SPX and compatible	Novell NetWare Microsoft Windows 98/Me/NT4.0/2000/XP (32-bit only), Direct Mode	J6035C (175x)*** J6038A (310x) J7942A (en3700) J6061A (380x) J6039C (200m)*** J6042B (250m) J6044A (280m) J4167A (610n) J6057A (615n) J7934A (620n) J6058A (680n)
AppleTalk (EtherTalk only)	Apple Mac OS	J6035C (175x) J6038A (310x) J7942A (en3700) J6061A (380x) J6039C (200m) J6042B (250m) J6044A (280m) J6057A (615n) J7934A (620n) J6058A (680n)
DLC/LLC	Microsoft Windows NT** Artisoft LANtastic**	J6038A (310x) J7942A (en3700) J6061A (380x) J6042B (250m) J6044A (280m) J4167A (610n) J6057A (615n) J7934A (620n) J6058A (680n)
* Refer to the current HP Jetdirect product data sheets for additional network systems and versions. For operation with other network environments, consult your system vendor or authorized HP dealer. ** For these network systems, contact your network system vendor for software, documentation, and support. *** Windows IP/IPX Direct Mode printing and LPD/Windows supported. NetWare is not supported. IPP is not supported. LPD/UNIX is not supported.		

If not supplied with this product, HP network setup and management software for supported systems may be obtained from HP support at:

http://www.hp.com/support/net_printing

For software to set up network printing on other systems, contact your system vendor.

Security Protocols

SNMP (IP and IPX)

SNMP (Simple Network Management Protocol) is used by network management applications for device management. HP Jetdirect print servers support SNMP and standard MIB-II (Management Information Base) objects on both IP and IPX networks.

HP Jetdirect 175x and 200m print servers support an SNMP v1/v2c agent only.

Full-featured HP Jetdirect print servers support an SNMP v1/v2c agent, and an SNMP v3 agent for enhanced security.

HTTPS

Full-featured HP Jetdirect print servers support HTTPS (Secure Hyper Text Transfer Protocol) for secure, encrypted management communications between the embedded Web server and your Web browser.

Value-based print servers (for example, HP Jetdirect 175x and 200m) do not support HTTPS.

Authentication (Wireless Print Servers)

Server-Based Authentication

HP Jetdirect 802.11b wireless print servers support popular authentication server-based methods for network access based on IEEE 802.1x Extensible Authentication Protocol (EAP), including:

- **LEAP** (Lightweight Extensible Authentication Protocol). LEAP is a proprietary protocol from Cisco Systems, Inc. It uses passwords for mutual authentication between a client and a network authentication server. Dynamic encryption keys are used for secure communications.
- **PEAP** (Protected Extensible Authentication Protocol). PEAP is a mutual authentication protocol that uses digital certificates for network server authentication and passwords for client authentication. For additional security, the authentication exchanges are encapsulated within TLS (Transport Layer Security). Dynamic encryption keys are used for secure communications.
- **EAP-MD5** (EAP using Message Digest Algorithm 5, RFC 1321). EAP-MD5 is a one-way authentication protocol that authenticates the client using a password protected by the MD5 encryption algorithm.
- **EAP-TLS** (EAP using Transport Layer Security, RFC 2716). EAP-TLS is a mutual authentication protocol based on X.509-compliant digital certificates for authentication of both the client and the network authentication server. Dynamic encryption keys are used for secure communications.
- **EAP-TTLS** (EAP using Tunneled Transport Layer Security). EAP-TTLS is an EAP-TLS extension that supports:
  - mutual authentication through client and server X.509-compliant digital certificates, or
  - one-way authentication through certificate-based server authentication followed by tunneled password-based client authentication. For additional security, the authentication exchanges are encapsulated within TLS (Transport Layer Security).

  TTLS uses dynamic encryption keys for secure communications.

Without an Authentication Server

For small office networks that do not have an authentication server, HP Jetdirect wireless print servers support network authentication using Extensible Authentication Protocol with a Pre-shared key (EAP/PSK). Using a pass-phrase entered by the user, the print server generates a pre-shared key used for network access and communications.

When configured for EAP/PSK authentication, the print server uses Wi-Fi Protected Access (WPA) dynamic encryption protocols for wireless communications.

Encryption

HP Jetdirect 802.11b wireless print servers support static WEP (Wired Equivalent Privacy) encryption. For static WEP encryption, a network WEP key of fixed length (40/64-bit or 104/128-bit) is shared by each device on the network.

Depending on your wireless print server model, the following dynamic encryption protocols are supported:

- dynamic WEP
- Wi-Fi Protected Access (WPA)

Note If not supported by your HP Jetdirect wireless print server, EAP/PSK authentication and Robust encryption will not be displayed as a selectable configuration option.

When dynamic encryption is used, encryption keys are periodically changed automatically and provide enhanced security because they will likely change before someone can decipher them.

In dynamic WEP encryption, each device on the wireless network is assigned a different encryption key that expires at preset intervals and is then replaced.

WPA encryption is an enhanced version of dynamic WEP and offers improved security. For example, new encryption keys are generated for fixed amounts of data (10 kilobytes) transmitted by a device on the network.

Supplied Manuals

The manuals listed below are supplied with your print server or with printers that have factory-installed print servers.

- Getting Started Guide, User Guide or equivalent printer documentation (shipped with printers that have factory-installed HP Jetdirect print servers).
- This manual, the HP Jetdirect Print Server Administrator's Guide.
- HP Jetdirect Setup Guide (for 615n/620n print servers only), supplied on CD-ROM with off-the-shelf print servers).
- The HP Jetdirect Wireless Print Server Setup Guides (for 680n and 380x print servers only, supplied with off-the-shelf print servers).
- The HP Jetdirect Print Server User's Guides (for 175x/310x/en3700 and 200m/250m/280m print servers, supplied on CD-ROM with off-the-shelf print servers).

HP Support

HP Online Support

Click your way to a quick solution! The HP Web site

http://www.hp.com/support/net_printing

is a great place to start for answers to questions about your HP Jetdirect print server — 24 hours a day, 7 days a week.

Firmware Upgrades

Hewlett-Packard offers downloadable firmware upgrades for HP Jetdirect print servers that contain upgradeable memory (HP Jetdirect 175x and 200m products are not upgradeable). The upgrades are available from the World Wide Web at:

http://www.hp.com/go/webjetadmin_firmware

Firmware Installation Tools

Firmware upgrades for supported HP Jetdirect print servers may be installed over a network using one of the following firmware installation tools:

- HP Jetdirect Download Manager (Windows). HP Jetdirect Download Manager can be downloaded from HP online support at:

  http://www.hp.com/go/dlm_sw

- HP Web Jetadmin may be used on supported systems. For more information on HP Web Jetadmin, visit:

  http://www.hp.com/go/webjetadmin/

- For firmware versions x.24.00 and later, the embedded Web server resident on the print server provides a firmware upgrade feature using your Web browser. For more information see Chapter 4.

- For firmware versions x.22.00 and later, FTP (File Transfer Protocol) may be used to transfer a firmware upgrade image file to the print server. To start an FTP session, use the device IP address or host name. If a password is set, it must be entered to log into the device. After user login, typical FTP commands to upgrade the device are illustrated below:

```
ftp> bin
ftp> hash
ftp> cd  /download
ftp> put <firmware image filename; specify full pathname>
ftp>######### <Wait for FTP to complete the download>
ftp> bye
```

HP Support By Phone

Highly trained technicians are ready to take your call. For the most recent HP support telephone numbers and available services worldwide, visit:

http://www.hp.com/support/support_assistance

Note For toll-free support in the USA and Canada, call 1-800-HPINVENT or 1-800-474-6836.

Note Telephone fees are the responsibility of the caller. Rates may vary. Contact your local telephone company for current rates.

Product Registration

To register your HP Jetdirect print server, use the following HP Web page:

http://www.hp.com/go/jetdirect_register

2

HP Software Solutions Summary

Introduction

HP provides a variety of software solutions to set up or manage your HP Jetdirect-connected network devices. See Table 2.1 to help you determine which software is best for you.

Note For more information on these and other solutions, visit HP online support at:

http://www.hp.com/support/net_printing

Table 2.1 Software Solutions (1 of 3)

Operating Environment	Function	Remarks
HP Jetdirect Wireless Setup Wizard (Windows)		
Windows 98, Me, NT 4.0, 2000, XP (32-bit only), Server 2003	Configure a single HP Jetdirect wireless print server for a wireless connection to your network. (Note: This wizard does not install the printer on your system.)	● Runs from CD-ROM on a wireless computer ● Allows you to set IP address parameters ● Installable version that runs from your hard disk is available
HP Install Network Printer Wizard (Windows)		
Windows 98, Me, NT 4.0, 2000, XP* (Direct Mode IP and IPX), Server 2003 NetWare 4.x, 5.x, 6.0 (IPX/SPX only) *IPX/SPX not supported on Windows XP 64-bit edition.	Install a single network printer on your system for peer-to-peer (direct mode) or client-server (shared) printing.	● Simple printer installation, typically integrated with printer system software ● Runs from CD-ROM ● Installable version that runs from your hard disk is available

Table 2.1 Software Solutions (2 of 3)

Operating Environment	Function	Remarks
HP Jetdirect Printer Installer for UNIX		
HP-UX 10.x-10.20, 11.x Solaris 2.6, 7, 8 (SPARCsystems only) TCP/IP	Fast and easy installation of HP Jetdirect-connected printers.	● Supplied on the HP Jetdirect CD-ROM, and may be downloaded from HP's Website
HP Web Jetadmin		
(See the HP Website for supported system updates.) Windows NT 4.0, 2000, XP Professional, Server 2003 HP-UX* Solaris* Red Hat Linux, SuSE Linux NetWare* TCP/IP, IPX/SPX *Supports queue creation and peripheral management from HP Web Jetadmin hosted on Windows NT 4.0, 2000, XP, Server 2003.	Remote installation, configuration, and management of HP Jetdirect-connected print servers, non-HP printers that support the standard MIBs, and printers with embedded Web servers. Alerts and consumables management. Remote firmware upgrades for HP Jetdirect print servers. Asset tracking and utilization analysis.	● HP's preferred solution for ongoing management and installation of multiple printers anywhere on your intranet ● Browser-based management
Internet Printer Connection Software		
Windows NT 4.0, 2000 (Intel) TCP/IP only Note: Microsoft Internet Printing software is also integrated with Windows 2000.	Printing through the Internet to Internet Printing Protocol (IPP)-enabled HP Jetdirect-connected printers.	● Allows economical distribution of high-quality hardcopy documents over the Internet, replacing fax, mail, and overnight services ● Requires HP Jetdirect print server (firmware version x.20.00 or later) ● IPP is not supported on value-based products, such as 175x, 200m

Table 2.1 Software Solutions (3 of 3)

Operating Environment	Function	Remarks
HP IP/IPX Printer Gateway for NDPS		
NetWare 5.x, 6.0 (IPX only)	Simplified installation, printing, and bidirectional management of HP Jetdirect-connected printers under Novell Distributed Print Services (NDPS). Allows automatic discovery and installation of HP Jetdirect-connected printers into NDPS.	● Frees up user licenses ● Allows disabling of SAPs to reduce network traffic ● Requires HP Jetdirect firmware version x.20.00 or later
HP WPS Assistant (Mac OS X)		
Mac OS X 10.1.5 or later	Configuration of HP Jetdirect wireless print servers with a connection to your network.	● Requires HP Jetdirect wireless print servers with firmware version x.24.00 or later ● Distributed on the HP Jetdirect CD-ROM
HP LaserJet Utilities for Mac OS		
Mac OS 9.x, X (Classic Mode)	Configuration and management of HP Jetdirect-connected printers.	

HP Jetdirect Wireless Setup Wizard

The HP Wireless Setup Wizard is a software utility that configures your HP Jetdirect wireless print server with a wireless connection to your network.

Note that the HP Wireless Setup Wizard does not install the printer on your system. After a wireless network connection is established, you must use other HP printer installation utilities, or standard Operating System tools, to install the printer on your network systems. When installing the printer on a system, the wireless printer should appear like any other printer on your network.

The HP Wireless Setup Wizard is provided on CD-ROM with each HP Jetdirect wireless print server. The wizard must be run on a supported wireless computer that has been preconfigured to communicate with the HP Jetdirect print server. A version of the HP Wireless Setup Wizard that runs from your system disk is also available, and can be downloaded from HP online support at:

www.hp.com/go/jdwsw_software

Note Although primarily intended for configuration of wireless networking parameters, the HP Wireless Setup Wizard also allows you to preconfigure a valid IP address on the print server, as required (for example, to accommodate special DHCP requirements or Access List restrictions).

Requirements

- Wireless computer, typically a laptop PC
- Microsoft Windows XP (32-bit only), Windows 2000, Windows NT 4.0, Windows 98, Windows Me

HP Install Network Printer Wizard (Windows)

The HP Install Network Printer Wizard is a software module for quick and easy printer installation on a TCP/IP or IPX/SPX network. The wizard allows you to configure the printer with IP parameters on a TCP/IP network, or NDS/Bindery objects on a Novell NetWare IPX/SPX network.

The HP Install Network Printer Wizard is included on the HP Jetdirect CD-ROM supplied with standalone HP Jetdirect products. The wizard is run through the **Install** selection on the Jetdirect CD-ROM interface. The wizard runs from the CD-ROM, although some files may be temporarily stored and then removed from your system disk after a system reboot.

In addition, a version of this wizard is typically integrated with your printer system installation software and runs from a CD-ROM supplied with HP network-ready printers. However, this version may not support Novell NetWare network installations.

A version that runs from your system disk is also available and can be downloaded from HP online support at:

http://www.hp.com/go/inpw_sw

Requirements

- Microsoft Windows XP, Windows 2000, Windows NT 4.0, Windows 98/Me, Server 2003
  - TCP/IP or IPX/SPX network protocol
- Novell NetWare 4.x, 5.x, 6.0
  - Novell Client software for Microsoft Windows 98/NT 4.0/2000/XP
  - Queue Server Mode
  - IPX/SPX network protocol
- The correct printer driver
- Printer connection to the network through an HP Jetdirect print server

HP Jetdirect Printer Installer for UNIX

The HP Jetdirect Printer Installer for UNIX contains support for HP-UX and Solaris systems. The software installs, configures and provides diagnostics capabilities for HP printers connected to TCP/IP networks using full-featured HP Jetdirect print servers. Value-based print servers, such as 175x and 200m, are not supported.

The software is distributed through the following methods:

- HP Jetdirect CD-ROM, provided with standalone HP Jetdirect print servers
- Anonymous FTP site at ftp.hp.com (Directory: /pub/networking/software)
- HP online support at:

  http://www.hp.com/support/net_printing

For system requirements and installation information, see the documentation provided with the software.

HP Web Jetadmin

HP Web Jetadmin is an enterprise management tool that allows you to remotely install, configure and manage a wide variety of HP and non-HP network printing devices simply through a standard Web browser. HP Web Jetadmin can be used to proactively manage both individual or groups of devices.

While HP Web Jetadmin supports devices that contain Standard Printer MIB (Management Information Base) objects for common management, it is well-integrated with HP Jetdirect print servers and HP printers to provide enhanced management features.

To use HP Web Jetadmin, see the online help and documentation supplied with the software.

System Requirements

HP Web Jetadmin software runs on Microsoft Windows NT 4.0, Windows 2000, Windows XP Professional, Windows Server 2003, Red Hat Linux, and SuSE Linux systems. For information on supported operating systems, clients, and compatible browser versions, visit HP online support at http://www.hp.com/go/webjetadmin.

Note When installed on a supported host server, HP Web Jetadmin can be accessed from any client through a compatible Web browser by browsing to the HP Web Jetadmin host. This allows printer installation and management on Novell NetWare and other networks.

Installing HP Web Jetadmin

Before installing the HP Web Jetadmin software, you must have administrator or root privileges on the local system:

1. Download the installation files from HP online support at http://www.hp.com/go/webjetadmin.
2. Follow the instructions on the screen to install the HP Web Jetadmin software.

Note Installation instructions are also contained in the HP Web Jetadmin install file.

Verifying Installation and Providing Access

- Verify that the HP Web Jetadmin software is correctly installed by navigating to it with your browser as shown in the following example:

  `http://systemname.domain:port/`

  where `systemname.domain` is the host name of your Web server and `port` is the port number assigned during installation. By default, the port number is 8000.

- Provide users access to HP Web Jetadmin software by adding a link to your Web server's home page that is addressed to HP Web Jetadmin's URL. For example:

  `http://systemname.domain:port/`

Configuring and Modifying a Device

Using your browser, navigate to HP Web Jetadmin's URL.
For example:

```
http://systemname.domain:port/
```

Follow the instructions on the appropriate home page to configure or modify your printer.

Note You can also substitute the `systemname.domain` with the TCP/IP address.

Removing HP Web Jetadmin Software

To remove HP Web Jetadmin software from your Web server, use the uninstall program provided with the software package.

Internet Printer Connection Software

Full-featured HP Jetdirect print servers (firmware version x.20.00 or later) support the Internet Printing Protocol (IPP). Value-based print servers, such as 175x and 200m, are not supported.

Using the appropriate software on your system, you can create an IPP print path from your system to a supported HP Jetdirect-connected printer over the Internet.

Note For incoming print path requests, the network administrator must configure the firewall to accept incoming IPP requests. Security features available in the software are currently limited.

Features and benefits provided by Internet printing include:

- High-quality, time-sensitive documents can be printed remotely, in full-color or black-and-white
- Documents can be printed remotely at a fraction of the cost of current methods (such as fax, mail, or overnight delivery services)
- The traditional LAN printing model can be extended to that of an Internet Printing Model
- IPP requests for sending print jobs can be transmitted outbound through firewalls

HP-Supplied Software

HP Internet Printer Connection software allows you to set up Internet printing from Windows NT 4.0 and Windows 2000 clients.

1. To obtain the software:

   Download the HP Internet Printer Connection software from HP online support at:

   http://www.hp.com/support/net_printing

2. To install the software and set up the print path to the printer, follow the instructions provided with the software. Contact your network administrator to get the IP address or URL of the printer to complete the setup.

HP Software System Requirements

- Computer running Microsoft Windows NT 4.0 (Intel-based) or Windows 2000
- IPP-enabled HP Jetdirect print server (firmware must be at revision x.20.00 or later)

HP Software Supported Proxies

Web proxy with support for HTTP v1.1 or greater (may not be needed if printing over an intranet).

Microsoft Supplied Software

Note Contact Microsoft for support of Windows IPP software.

Windows 2000/XP Integrated Software

On Windows 2000/XP systems, an alternative to using the HP supplied software is to use the IPP-client software integrated with Windows 2000/XP. The IPP implementation on the HP Jetdirect print server is compatible with Windows 2000/XP IPP-client software.

To set up a print path to an HP Jetdirect-connected Internet printer using the Windows 2000/XP IPP-client software, proceed as follows:

1. Open the **Printers** folder (click **Start**, select **Settings**, and select **Printers**).
2. Run the Add Printer wizard (double-click **Add Printer**), then click **Next**.
3. Select the option for a network printer and click **Next**.

4. Select **Connect to a printer on the Internet** and enter the print server's URL:

   `http://`*`IP_address`*[/ipp/*`port#`*]

   where *`IP_address`* is the IP address configured on the HP Jetdirect print server. [/ipp/port#] identifies the port number on a multi-port HP Jetdirect external print server (port1, port2, or port3) that the printer is connected to (default is /ipp/port1).

Examples:	
http://192.160.45.40	An IPP connection to HP Jetdirect 610N/615N internal print server with IP address 192.160.45.40. ("/ipp/port1" is assumed and not required.)
http://192.160.45.39/ipp/port2	An IPP connection to HP Jetdirect external print server with IP address 192.160.45.39 and the printer on port 2

   Then click **Next**.

5. You will be prompted for a printer driver (the HP Jetdirect print server does not contain printer drivers, so your system cannot automatically obtain the driver). Click **OK** to install the printer driver onto your system and follow the instructions on the screen. (You may need your printer CD-ROM to install the driver.)

6. To complete the print path setup, follow the instructions on the screen.

Windows Me IPP Client

The IPP implementation on the HP Jetdirect print server is compatible with Windows Me IPP-client software. The IPP client is installed from the **Add-Ons** folder on the Windows Me CD-ROM. For installation and setup of a Windows Me IPP client, see the instructions provided with the Windows Me CD-ROM.

Novell Supplied Software

The HP Jetdirect print server is compatible with IPP running on NetWare 5.1 with SP1 or later. For NetWare client support, refer to your NetWare technical documentation or contact Novell.

HP IP/IPX Printer Gateway for NDPS

NDPS (Novell Distributed Print Services) is a printing architecture developed by Novell in partnership with Hewlett-Packard. NDPS simplifies and streamlines the administration of network printing. It eliminates the need to set up and link print queues, printer objects, and print servers. Administrators can use NDPS to manage networked printers within supported NetWare environments.

The HP IP/IPX Printer Gateway is a NetWare Loadable Module (NLM) developed by HP to provide functionality and compatibility with Novell's NDPS for full-featured HP Jetdirect print servers. Value-based print servers, such as 175x and 200m, are not supported.

The HP Gateway seamlessly integrates HP Jetdirect-attached printers into the NDPS environment. Using the HP Gateway, an administrator can view statistics, configure gateway settings, and configure printing for HP Jetdirect-connected printers.

Features

Features and benefits provided by the HP Gateway and NDPS include:

- Smart detection of printers in NetWare 5.x, 6.0 environments
- Automatic installation of printers using IP/IPX
- Tight integration with Novell's NDS and NWAdmin
- Status updates from printers
- Simplified Automatic Driver Download
- Reduced SAP Traffic
- Reduced number of required NetWare User Licenses
- Native TCP/IP printing with NetWare 5.x, 6.0

To Get the Software

The HP IP/IPX Printer Gateway is included with all current versions of NDPS. Novell NetWare 5.x and 6.0 includes NDPS. To obtain the most recent software version, or to obtain the related documentation:

- Visit http://www.hp.com/go/hpgate_sw
- Select and follow the instructions for downloading drivers and software.

System requirements and Novell Client support are included in the documentation supplied with the software.

HP WPS Assistant (Mac OS X)

This utility allows you to configure an HP Jetdirect wireless print server (WPS) with a connection to your Mac OS network.

To use this utility, the HP Jetdirect wireless print server must be in a factory-default state. Proceed as follows:

1. Insert the CD-ROM into your Mac OS system (version X 10.1.5 or later).
2. Select and open the **HPJETDIRECT** CD-ROM icon.
3. If provided, read the release notes for updated information.
4. Select and open the **HP WPS Assistant** folder.
5. Run the HP WPS Assistant utility, then follow the instructions on the screen.

Note Optionally, for Mac OS 9.x or X systems, you may use the embedded Web server to configure a network connection. See Appendix B.

Once a wireless connection has been created, you will need to use other utilities (such as the HP LaserJet Utility for Mac OS) to configure and manage your printer for printing.

HP LaserJet Utilities for Mac OS

The HP LaserJet Utilities for Mac OS allow you to configure and manage your HP Jetdirect-connected printers on AppleTalk networks. This section describes software installation and use of the HP LaserJet Utilities. In addition, it describes how to use the Chooser to select and set up a Mac OS computer to print to your HP printer.

Installing the Printer Software

If the HP LaserJet Utility was included on your printer's CD-ROM, see your printer documentation for installation instructions, then skip to the next section to configure the printer.

If you are installing the HP LaserJet Utility from the HP Jetdirect CD-ROM, use the following installation instructions.

Note If you are installing the HP LaserJet Utility from a source other than the CD-ROM, see the README file that accompanies the software for installation instructions.

Note Automatic virus detection programs might interfere with the installation of this software. Turn off any such programs that are active on your Mac OS computer before proceeding with the installation process.

1. Insert the CD-ROM into the CD-ROM drive.
2. In the **HP Installer** window, double-click the installation icon for the software in the language you want.
3. Follow the instructions on the screen.

For more information about configuring your printer driver, see the online documentation provided on the CD-ROM that came with the printer.

Configuring the Printer

The HP LaserJet Utility allows printer settings such as printer name and preferred zone to be configured from your Mac OS system. Hewlett-Packard recommends that only network administrators use the printer configuration capabilities of this utility.

If this printer is to be serviced by a print spooler, set up the printer's name and zone before configuring the spooler to capture the printer.

Running the HP LaserJet Utility

1. With the printer turned on and online, and the print server connected to the printer and to the network, double-click the **HP LaserJet Utility** icon.
2. If the printer's name is not listed as the target printer, click **Select Printer**. The **Select a Target** Printer window appears.
   - Select the zone, if necessary, from the AppleTalk Zones list in which the printer resides. The zone the printer is in is shown on the configuration page. See the hardware installation guide for your print server or your printer's Getting Started guide for instructions on printing a configuration page.
   - Select the printer from the **Available Printers** list and click **OK**.

Verifying Network Configuration

To verify your current network configuration, print a Jetdirect configuration page. If you have not printed a configuration page from your printer, see the hardware installation guide for your print server or your printer documentation for instructions (see Chapter 9 for more information). If your printer has a control panel, make sure a READY message appears on the control panel for at least 1 minute, then print the page. The current configuration is listed under "AppleTalk" on the configuration page.

Note If you have multiple printers on your network, you need to print a configuration page to identify the printer's name and zone.

Renaming the Printer

The factory supplies a default name for your printer. **Hewlett-Packard highly recommends that you rename your printer to avoid having multiple printers with similar names on your network.**

CAUTION After you have renamed the printer and have set up print queues to that printer, use caution when changing the printer name again. If you rename the printer again, the queues for that printer will no longer function.

Note The name may be up to 32 characters in length. A warning beep indicates that an illegal character was typed. For illegal characters, see the Help system integrated with the software.

You can name your printer anything you like—for example, "Michael's LaserJet 4000." The HP LaserJet Utility has the ability to rename devices located in different zones, as well as the local zone (no zones need to be present in order to use the HP LaserJet Utility).

1. Select the **Settings** icon from the scrolling icon list. The **Please select a setting:** dialog appears.
2. Select **Printer Name** in the list.
3. Click **Edit**. The **Set Printer Name** dialog box appears.
4. Type the new name.
5. Click **OK**.

Note If you try to name your printer the same name as another printer, an alert dialog box appears directing you to select another name. To select another name, repeat steps 4 and 5.

6. If your printer is on an EtherTalk network, continue with the next section, "Selecting a Zone."

7. To exit, select **Quit** from the **File** menu.

Notify everyone on your network of the new name for your printer so they can select the printer in the Chooser.

Selecting a Zone

The HP LaserJet Utility allows you to select a preferred zone for your printer on a Phase 2 EtherTalk network. Instead of your printer remaining on the default zone, which is set by the router, this utility lets you select the zone on which your printer appears. The zones on which your printer can reside are limited by your network configuration. **The HP LaserJet Utility only enables you to select a zone that is already configured for your network.**

Zones are groups of computers, printers, and other AppleTalk devices. They can be grouped by physical location (for example, Zone A may contain all the printers on the network in building A). They may also be grouped logically (for example, all printers used in the finance department).

1. Select the **Settings** icon from the scrolling icon list. The **Please Select a Setting:** dialog box appears.
2. Select **Printer Zone** in the list and click **Edit**. The **Select a Zone** dialog box appears.
3. Select your preferred network zone from the **Select a Zone:** list and click **Set Zone**.
4. To exit, select **Quit** from the **File** menu.

Notify everyone on your network of the new zone for your printer so they can select the printer in the Chooser.

Selecting Your Printer

1. Select the **Chooser** from the **Apple** menu.
2. Select the printer icon for use with your printer. If the appropriate printer icon does not appear in the Chooser, or you are not sure which icon to select for your printer, see “Installing the Printer Software” in this chapter.

3. If AppleTalk is not active, an alert dialog box appears on your screen. Select **OK**. The **Active** button turns on.

   If your network is linked to other networks, the **AppleTalk Zones** list dialog box appears in the Chooser.

4. If applicable, select the zone in the **AppleTalk Zones** scrolling list where your printer is located.

5. Select the printer name you want to use from the list of printer names in the upper-right area of the Chooser. If the printer's name does not appear in the list, make sure the following tasks have been performed:

   - the printer is turned on and is online.
   - the print server is connected to the printer and to the network.
   - the printer cable connections are secure.

   A READY message should appear if the printer has a control panel display. See Chapter 8 for more information.

Note **If your printer is the only name listed in the dialog box, you must still select it.** Your printer remains selected until you select a different printer with the Chooser.

6. Click **Setup** or **Create** in the Chooser; then, if prompted, select the appropriate PostScript Printer Description file (PPD) for the printer. For more information, see the online documentation.

7. Set **Background Printing** to **ON** or **OFF**.

   If background printing is turned **OFF** when you send a print job to the printer, status messages appear on your screen and you have to wait until the messages clear before continuing your work. If background printing is turned **ON**, the messages are redirected to the PrintMonitor and you can continue working while the printer is printing your job.

8. Exit the Chooser.

To display your user name on the network when you are printing documents, go into the Control Panel on your Mac OS computer, select **Sharing Setup**, then type your owner name.

Testing the Configuration

1. Select **Print Window** from the *File* menu, or if no window is open, select **Print Desktop**.

   The *Print* dialog box appears.

2. Click **Print**.

   If the printer prints the job, you have connected your printer to your network correctly. If your printer does not print, see Chapter 8.

3

TCP/IP Configuration

Introduction

To operate properly on a TCP/IP network, the HP Jetdirect print server must be configured with valid TCP/IP network configuration parameters, such as an IP address that is valid for your network. For general information on TCP/IP networks, see Appendix A.

Server-Based and Manual TCP/IP Configuration

When in a factory-default state and powered on, the HP Jetdirect print server will try to obtain its TCP/IP configuration using a server-based method, such as BOOTP/TFTP, DHCP/TFTP, or RARP. These server-based methods are described later in this chapter.

The print server may also be configured manually. Manual-based tools include Telnet, a Web browser, the printer control panel, arp and ping commands (when the default IP address is 192.0.0.192), or SNMP-based management software. TCP/IP configuration values assigned manually will be retained when powered off/on.

The print server can be reconfigured to use either server-based or manual configuration of TCP/IP settings at any time.

Default IP Address

When in a factory-default state (for example, when shipped from the factory or after a cold-reset), the HP Jetdirect print server has no IP address. A default IP address may or may not be assigned depending on the network environment.

Default IP Address Will Not Be Assigned

A default IP address will not be assigned if a server-based method (such as BOOTP or DHCP) is successful. And if the print server is powered off/on, the same method will again be used to retrieve IP configuration settings. If this method now fails to retrieve the IP configuration settings (for example, the BOOTP or DHCP server is no longer available), a default IP address will not be assigned. Instead, the print server will continue to send IP configuration requests indefinitely. You must cold-reset the print server to change this behavior.

In addition, a default IP address will not be assigned if a network cable is not attached to a wired print server.

Default IP Address Will Be Assigned

A default IP address will be assigned if the factory-default methods fail, or if the print server has just been reconfigured by an administrator to use a server-based method (such as BOOTP or DHCP) that fails.

If a default IP address is assigned, the address will depend on the network to which the print server is connected. The print server senses broadcast packets on the network to determine the appropriate default IP settings:

- On small private networks that adhere to automated, standards-based IP address assignments, the print server uses a link-local addressing technique to assign a unique IP address. Link-local addressing may be referenced as *Auto IP*. The IP address assigned will be in the range of 169.254.1.0 to 169.254.254.255 (commonly referenced as 169.254/16), and should be valid. However, it can be further modified for your network using supported TCP/IP configuration tools if necessary.

With link-local addresses, subnetting is not used. The subnet mask will be 255.255.0.0, and cannot be changed.

Link-local addresses will not route off the local link, and access to or from the Internet will not be available. The default gateway address will be the same as the link-local address.

If a duplicate address is sensed, the HP Jetdirect print server will automatically reassign its address, if necessary, in accordance with standard link-local addressing methods.

- On large or enterprise IP networks, a temporary address of 192.0.0.192 will be assigned until it is reconfigured with a valid address through supported TCP/IP configuration tools. We refer to this address as *Legacy Default IP*.
- On mixed-environment networks, the self-assigned default IP address may be either 169.254/16 or 192.0.0.192. In this case, you should verify on the Jetdirect configuration page that the assigned default IP address is as expected.

The IP address configured on your print server may be determined by inspecting the Jetdirect configuration page for the print server. See Chapter 9.

Default IP Address Configuration Options

Default IP Parameter

A Default IP configuration parameter on the print server controls the default IP method.

When the print server is in a factory-default state, this parameter is undefined. If the print server is initially configured with a default IP address (either a link-local or 192.0.0.192 IP address), the Default IP parameter will be assigned either Auto IP or Legacy Default IP to match. This parameter setting will determine the IP address to use when the print server is unable to obtain an IP address from the network during a forced TCP/IP reconfiguration (for example, when manually configured to use BOOTP or DHCP).

The Default IP parameter can be changed through a supported configuration tool, such as Telnet, a Web browser, and SNMP management applications.

DHCP Requests Enable/Disable

When a default IP address is assigned, you can choose to send, or not send, periodic DHCP requests. DHCP requests are used to retrieve IP configuration settings from a DHCP server on the network. By default, this parameter is enabled, allowing DHCP requests to be transmitted. However, this parameter may be disabled through supported configuration tools such as Telnet, a Web browser, and SNMP management applications.

HP Jetdirect Wireless Print Server. When initially powered on, a factory-default wireless print server that has no connection to a network will likely self-assign a link-local IP address. If a network connection to a DHCP server-based network is made, the IP address will likely be reconfigured because DHCP requests on the print server are enabled by default.

Default IP on Wireless and Wired Print Servers

Wired and wireless print servers may have different default IP configuration results:

- When powered on, a factory-default wired print server will systematically use BOOTP, DHCP, and RARP to retrieve its IP settings. Up to two minutes are used. If configuration is not successful, a default IP address will be assigned as described previously.
- For a factory-default wireless print server, a network connection must first be configured before it can communicate on a network. Therefore, retrieval of IP settings from a network is limited to about four seconds. During this time, a single BOOTP request is transmitted, and broadcast packets are sensed. Because a response from a BOOTP server on an Ad Hoc network is unlikely, and the number of broadcast packets sensed will be minimal, a default IP configuration using link-local addressing is likely.

  However, the IP configuration may change once the wireless print server is connected a DHCP network because the sending of DHCP requests will be enabled by default.

Configuration tools that require a specific default IP address to initially communicate with a factory-default print server may not work without modification. For the default IP address settings on the print server, see the Jetdirect configuration page.

TCP/IP Configuration Tools

Depending on your printer and operating system, an HP Jetdirect print server can be configured with valid TCP/IP parameters for your network in the following ways:

- **Using Software.** You can use your printer installation software or the HP Jetdirect print server installation software on supported systems. For more information see Chapter 2, "HP Software Solutions Summary".

  To configure a wireless print server with a valid IP address *before* a wireless connection is established, use the HP Jetdirect Wireless Setup Wizard (Windows) or the embedded Web server. Printer installation software may be used for IP configuration of network-connected printers only.

- **BOOTP/TFTP.** You can download the data from a network-based server using BOOTP (Bootstrap Protocol) and TFTP (Trivial File Transfer Protocol) each time the printer is turned on. For more information, see "Using BOOTP/TFTP".

  The BOOTP daemon, bootpd, must be running on a BOOTP server that is accessible by the printer.

- **DHCP/TFTP.** You can use Dynamic Host Configuration Protocol (DHCP). This protocol is supported in HP-UX, Solaris, Red Hat Linux, SuSE Linux, Windows NT/2000/XP, NetWare and Mac OS systems. (Refer to your network operating system manuals to verify that your server operating system supports DHCP.) For more information, see "Using DHCP".

Note Linux and UNIX systems: For more information, see the bootpd man page.

On HP-UX systems, a sample DHCP configuration file (dhcptab) may be located in the `/etc` directory.

Since HP-UX presently does not provide Dynamic Domain Name Services (DDNS) for its DHCP implementations, HP recommends that you set all print server lease durations to *infinite*. This ensures that print server IP addresses remain static until such time as Dynamic Domain Name Services are provided.

- **RARP.** A network-based server can use RARP (Reverse Address Resolution Protocol) to answer the print server's RARP request and supplying the print server with the IP address. The RARP method only allows you to configure the IP address. For more information, see “Using RARP”.
- **arp and ping commands.** (For print servers configure with Legacy default IP address 192.0.0.192 only) You can use the `arp` and `ping` commands from your system. For more information, see “Using the arp and ping Commands”.
- **Telnet.** You can set configuration parameters using Telnet. In order to set configuration parameters, set up a Telnet connection from your system to the HP Jetdirect print server using the default IP address. Once configured, the print server saves the configuration when powered off/on. For more information, see “Using Telnet”.
- **Embedded Web server.** You can browse to the embedded Web server on the HP Jetdirect print server and setting the configuration parameters. For more information, see Chapter 4.
- **Printer Control Panel.** (Internal Jetdirect print servers only) You can manually enter the configuration data using the printer control panel keys. The control panel method allows you to configure only a limited subset of configuration parameters (IP address, subnet mask, default gateway address, and idle timeout). Therefore, control panel configuration is recommended only during troubleshooting or for simple installations. If control panel configuration is used, the print server saves the configuration when powered off/on. For more information, see “Using the Printer Control Panel”.

Using BOOTP/TFTP

Note For HP Jetdirect *wireless* print servers, this section assumes that a wireless connection to your network has been established.

BOOTP (Bootstrap Protocol) and TFTP (Trivial File Transfer Protocol) provide a convenient way to automatically configure the HP Jetdirect print server for TCP/IP network operation. When powered on, the Jetdirect print server sends a BOOTP request message onto the network. A properly configured BOOTP server on the network will respond with a message that contains basic network configuration data for the Jetdirect print server. The BOOTP server's response may also identify a file that contains extended configuration data for the print server. The Jetdirect print server downloads this file using TFTP. This TFTP configuration file may be located on the BOOTP server, or a separate TFTP server.

BOOTP/TFTP servers are typically UNIX or Linux systems. Windows NT/2000 and NetWare servers can respond to BOOTP requests. Windows NT/2000 servers are configured through Microsoft DHCP services (see Using DHCP). However, Windows NT/2000 systems may require third-party software for TFTP support. For setup of NetWare BOOTP servers, refer to your NetWare documentation.

Note If the Jetdirect print server and BOOTP/DHCP server are located on different subnets, IP configuration may fail unless the routing device supports "BOOTP Relay" (allows the transfer of BOOTP requests between subnets).

Why Use BOOTP/TFTP?

Using BOOTP/TFTP to download configuration data has the following benefits:

- Enhanced configuration control of the HP Jetdirect print server. Configuration by other methods, such as a printer control panel, are limited to select parameters.
- Ease of configuration management. Network configuration parameters for the entire network can be in one location.
- Ease of HP Jetdirect print server configuration. Complete network configuration can be automatically downloaded each time the print server is powered on.

Note BOOTP operation is similar to DHCP, but the resulting IP parameters will be the same when powered off/on. In DHCP, IP configuration parameters are leased and may change over time.

When in its factory-default state and powered on, the HP Jetdirect print server will attempt to automatically configure itself using several dynamic methods, one of which is BOOTP.

BOOTP/TFTP on UNIX

This section describes how to configure the print server using BOOTP (Bootstrap Protocol) and TFTP (Trivial File Transfer Protocol) services on UNIX servers. BOOTP and TFTP are used to download network configuration data from a server to the HP Jetdirect print server over the network.

Systems That Use Network Information Service (NIS)

If your system uses NIS, you may need to rebuild the NIS map with the BOOTP service before performing the BOOTP configuration steps. Refer to your system documentation.

Configuring the BOOTP Server

For the HP Jetdirect print server to obtain its configuration data over the network, the BOOTP/TFTP servers must be set up with the appropriate configuration files. BOOTP is used by the print server to obtain entries in the `/etc/bootptab` file on a BOOTP server, while TFTP is used to obtain additional configuration information from a configuration file on a TFTP server.

When the HP Jetdirect print server is powered on, it broadcasts a BOOTP request that contains its MAC (hardware) address. A BOOTP server daemon searches the `/etc/bootptab` file for a matching MAC address, and if successful, sends the corresponding configuration data to the Jetdirect print server as a BOOTP reply. The configuration data in the `/etc/bootptab` file must be properly entered. For a description of entries, see “Bootptab File Entries”.

The BOOTP reply may contain the name of a configuration file containing enhanced configuration parameters. If the HP Jetdirect print server finds such a file, it will use TFTP to download the file and configure itself with these parameters. For a description of entries, see “TFTP Configuration File Entries“. Configuration parameters retrieved through TFTP are optional.

Note HP recommends that the BOOTP server be located on the same subnet as the printers it serves. **BOOTP broadcast packets may not be forwarded by routers unless the routers are properly configured.**

Bootptab File Entries

An example of a `/etc/bootptab` file entry for an HP Jetdirect print server is provided below:

```
picasso:\
    :hn:\
    :ht=ether:\
    :vm=rfc1048:\
    :ha=0001E6123456:\
    :ip=192.168.40.39:\
    :sm=255.255.255.0:\
    :gw=192.168.40.1:\
    :lg=192.168.40.3:\
    :T144=“hpnp/picasso.cfg”:
```

Note that the configuration data contains “tags” to identify the various HP Jetdirect parameters and their settings. Entries and tags supported by the HP Jetdirect print server (firmware version x.24.00 or later) are listed in Table 3.1.

Table 3.1 Tags Supported in a BOOTP/DHCP Boot file (1 of 4)

Item	RFC 2132 Option	Description
nodename	--	The name of the peripheral. This name identifies an entry point to a list of parameters for a specific peripheral. *nodename* must be the first field in an entry. (In the example above, *nodename* is “picasso”.)
ht	--	The hardware type tag. For the HP Jetdirect print server, set this to **ether** (for Ethernet) or **token** (for Token Ring). This tag must precede the **ha** tag.
vm	--	The BOOTP report format tag (required). Set this parameter to **rfc1048**.
ha	--	The hardware address tag. The hardware (MAC) address is the link-level, or station address of the HP Jetdirect print server. It can be found on the HP Jetdirect configuration page as the **HARDWARE ADDRESS**. On HP Jetdirect external print servers, it is printed on a label attached to the print server.
ip	--	The IP address tag (required). This address will be the HP Jetdirect print server’s IP address.

Table 3.1 Tags Supported in a BOOTP/DHCP Boot file (2 of 4)

Item	RFC 2132 Option	Description
sm	1	The subnet mask tag. The subnet mask will be used by the HP Jetdirect print server to identify the portions of an IP address that specify the network/subnetwork number and the host address.
gw	3	The gateway IP address tag. This address identifies the IP address of the default gateway (router) that the HP Jetdirect print server will use for communications with other subnets.
ds	6	DNS (Domain Name System) server's IP address tag. Only a single name server can be specified.
lg	7	The syslog server's IP address tag. It specifies the server that the HP Jetdirect print server sends syslog messages to. For more information, see Appendix A.
hn	12	The host name tag. This tag does not take a value but causes the BOOTP daemon to download the host name to the HP Jetdirect print server. The host name will be printed on the Jetdirect configuration page, or returned on an SNMP sysName request by a network application.
dn	15	Domain name tag. Specifies the domain name for the HP Jetdirect print server (for example, support.hp.com). It does not include the host name; it is not the Fully Qualified Domain Name (such as printer1.support.hp.com).
ef	18	Extensions file tag that specifies the relative path name of the TFTP configuration file. **Note:** This tag is similar to the vendor-specific tag T144, described below.
na	44	Tag for IP addresses of the NetBIOS-over-TCP/IP Name Server (NBNS). A primary and secondary server may be specified in order of preference.
lease-time	51	DHCP IP address lease duration time (seconds).
tr	58	DHCP T1 timeout, specifying the DHCP lease renewal time (seconds).

Table 3.1 Tags Supported in a BOOTP/DHCP Boot file (3 of 4)

Item	RFC 2132 Option	Description
tv	59	DHCP T2 timeout, specifying the DHCP lease rebind time (seconds).
T69	69	The IP address (in hexadecimal) of the preferred outgoing e-mail SMTP (Simple Mail Transport Protocol) server, for use with supported Scan devices.
T144	--	An HP-proprietary tag that specifies the relative path name of the TFTP configuration file. Long path names may be truncated. The path name must be in double quotes (for example, *"pathname"*). For file format information, refer to "TFTP Configuration File Entries". **Note:** Standard BOOTP option 18 (extensions file path) also allows a standard tag (**ef**) to specify the relative path name of the TFTP configuration file.
T145	--	Idle Timeout option. An HP-proprietary tag to set the idle timeout (seconds), which is the amount of time that a print data connection may remain idle before being closed. The range is 1 - 3600 seconds.
T146	--	Buffer Packing option. An HP-proprietary tag to set buffer packing for TCP/IP packets. 0 (default): Normal data buffers are packed before sending to the printer. 1: Disable buffer packing. Data is sent to the printer when received.
T147	--	Write Mode option. An HP-proprietary tag that controls the TCP PSH flag setting for device-to-client data transfers. 0 (default): disables this option, flag not set. 1: all-push option. The push bit is set in all data packets. 2: eoi-push option. The push bit is set only for data packets that have an End-of-Information flag set.
T148	--	IP Gateway Disable option. An HP-proprietary tag to prevent configuration of a Gateway IP address. 0 (default): allows an IP address. 1: prevents a Gateway IP address to be configured.

Table 3.1 Tags Supported in a BOOTP/DHCP Boot file (4 of 4)

Item	RFC 2132 Option	Description
T149	--	Interlock Mode option. An HP-proprietary tag that specifies whether an acknowledgement (ACK) on all TCP packets is required before the printer is allowed to close a Port 9100 print connection. To accommodate multiport print servers, a Port Number and Option value are specified, in the form: <*Port Number*> <*Option*> <*Port Number*>: Port Numbers can be 1 (default), 2, or 3. <*Option*>: Option value 0 (default) disables interlock, 1 enables. Example: 2 1 specifies <Port 2>, <interlock enabled>
T150	--	TFTP server's IP address option. An HP-proprietary tag to specify the TFTP server's IP address where the TFTP configuration file is located.
T151	--	Network Configuration option. An HP-proprietary tag to specify either "BOOTP-ONLY" or "DHCP-ONLY" requests be sent.

A colon (:) indicates the end of a field, and a backslash (\) indicates that the entry is continued on the next line. Spaces are not allowed between the characters on a line. Names, such as host names, must begin with a letter and can contain only letters, numbers, periods (for domain names only), or hyphens. The underline character (_) is not allowed. Refer to your system documentation or online help for more information.

TFTP Configuration File Entries

To provide additional configuration parameters for your HP Jetdirect print server, such as SNMP (Simple Network Management Protocol) or non-default settings, an additional configuration file can be downloaded using TFTP. This TFTP configuration file's relative path name is specified in the BOOTP reply using the `/etc/bootptab` file's T144 vendor-specific tag (or the "ef" standard BOOTP tag) entry. An example of a TFTP configuration file is provided below (the symbol '#' denotes a remark and is not included in the file).

```
#
# Example of an HP Jetdirect TFTP Configuration File
#
# Allow only Subnet 192.168.10 access to peripheral.
# Up to 10 'allow' entries can be written through TFTP.
# Up to 10 'allow' entries can be written through Telnet
# or embedded Web server.
# 'allow' may include single IP addresses.
#
allow: 192.168.10.0  255.255.255.0
#
#
# Disable Telnet
#
telnet-config: 0
#
# Enable the embedded Web server
#
ews-config: 1
#
# Detect SNMP unauthorized usage
#
auth-trap: on
#
# Send Traps to 192.168.10.1
#
trap-dest: 192.168.10.1
#
# Specify the Set Community Name
#
set-cmnty-name: 1homer2
#
# End of file
```

Table 3.2 lists the supported TFTP parameters (HP Jetdirect firmware version x.25.00 or later).

Table 3.3 describes the TFTP parameters.

Table 3.2 List of Supported TFTP Parameters (1 of 2)

General	
● passwd:	● ssl-state:
● sys-location:	● tftp-parameter-attribute:
● sys-contact:	
TCP/IP Main	
● host-name:	● pri-wins-svr:
● domain-name:	● sec-wins-svr:
● dns-svr:	● smtp-svr:
TCP/IP Print Options	
● 9100-printing:	● interlock:
● ftp-printing:	● buffer-packing:
● ipp-printing:	● write-mode:
● lpd-printing:	● mult-tcp-conn:
● banner:	
TCP/IP Raw Print Ports	
● raw-port:	
TCP/IP Access Control	
● allow: netnum [mask]	
TCP/IP Other Settings	
● syslog-config:	● ipv4-multicast:
● syslog-svr:	● idle-timeout:
● syslog-max:	● user-timeout:
● syslog-priority:	● ews-config:
● syslog-facility:	● tcp-mss:
● slp-config:	● tcp-msl:
● ttl-slp:	● telnet-config:
● mdns-config:	● default-ip:
● mdns-service-name:	● default-ip-dhcp:
● mdns-pri-svc:	● web-refresh:

Table 3.2 List of Supported TFTP Parameters (2 of 2)

SNMP	
• snmp-config:	• auth-trap:
• get-cmnty-name:	• trap-dest:
• set-cmnty-name:	
IPX/SPX	
• ipx-config:	• ipx-nds-context:
• ipx-unit-name:	• ipx-job-poll:
• ipx-frametype:	• ipx-banner:
• ipx-sapinterval:	• ipx-eoj:
• ipx-nds-tree:	• ipx-toner-low:
AppleTalk	
• appletalk:	
• name-override:	
DLC/LLC	
• dlc/llc:	
Other Settings	
• link-type:	• MFP-config:
• webscan-config:	• usb-mode:
• scan-idle-timeout:	• status-page-lang:
• scan-email-config:	
Support	
• support-name:	• support-url:
• support-number:	• tech-support-url:

Table 3.3 TFTP Configuration File Parameters (1 of 10)

General
passwd: A password (up to 16 alphanumeric characters) that allows administrators to control changes of HP Jetdirect print server configuration parameters through Telnet, HP Web Jetadmin, or embedded Web server. The password may be cleared by a cold reset.
sys-location: Identifies the physical location of the printer (SNMP sysLocation object). Only printable ASCII characters are allowed. The maximum length is 64 characters. The default location is undefined. (Example: `1st floor, south wall`)
sys-contact: ASCII character string (up to 64 characters) that identifies the person who administers or services the printer (SNMP sysContact object). This may include how to contact this person. The default contact is undefined.
ssl-state: Sets the print server's security level for Web communications: 1 (default): Forced redirection to the HTTPS port. Only HTTPS (secure HTTP) communications can be used. 2: Disable forced redirection to HTTPS. Both HTTP and HTTPS communications can be used.
tftp-parameter-attribute: Specifies whether TFTP parameters can be manually overwritten on the print server (for example, through Telnet) after it has been configured by TFTP. tftp-ro (default): Do not allow TFTP parameters to be manually changed, and always overwrite manual configurations. tftp-rw: Allow TFTP parameters to be manually changed, and always overwrite manual configurations. manual-ro: Do not allow TFTP parameters to overwrite manually configured parameters.
TCP/IP Main
host-name: Specifies the node name that will appear on the Jetdirect configuration page. Default is NPIxxxxxx, where xxxxxx is the last six digits of the LAN hardware address.
domain-name: The domain name for the device (for example, support.hp.com). It does not include the host name; it is not the Fully Qualified Domain Name (such as printer1.support.hp.com).
dns-svr: The IP address of the DNS (Domain Name System) server.

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pri-wins-svr: The IP address of the primary Windows Internet Name Service (WINS) server.
sec-wins-svr: The IP address of the secondary Windows Internet Name Service (WINS) server.
smtp-svr: The IP address of the outgoing e-mail Simple Mail Transport Protocol (SMTP) server, for use with supported Scan devices.
TCP/IP Print Options
9100-printing: Enables or disables printing to TCP port 9100 on the print server. 0 disables, 1 (default) enables.
ftp-printing: Enables or disables the ability to print through FTP: 0 disables, 1 (default) enables.
ipp-printing: Enables or disables the ability to print through IPP: 0 disables, 1 (default) enables.
lpd-printing: Enables or disables LPD (Line Printer Daemon) printing services on the Jetdirect print server. 0 disables, 1 (default) enables.
banner: A port-specific parameter that specifies printing an LPD banner page. 0 disables banner pages. 1 (default) enables banner pages.
interlock: Specifies whether an acknowledgement (ACK) on all TCP packets is required before the printer is allowed to close a Port 9100 print connection. To accommodate multiport print servers, a Port Number and Option value are specified. Port Numbers can be 1 (default), 2, or 3. Option value 0 (default) disables interlock, 1 enables. For example, "interlock 2 1" specifies Port 2, interlock enabled.
buffer-packing: Enables or disables buffer packing for TCP/IP packets. 0 (default): is normal, the data buffer is packed before sending to the printer. 1: disables buffer packing, data is sent to the printer as it is received.

Table 3.3 TFTP Configuration File Parameters (3 of 10)

write-mode: Controls the setting of the TCP PSH flag for device-to-client data transfers. 0 (default): disables this option, flag is not set. 1: all-push option. The push bit is set in all data packets. 2: eoi-push option. The push bit is set only for data packets that have an End-of-Information flag set.
mult-tcp-conn: Enables or disables multiple TCP connections. 0 (default): allows multiple connections. 1: disables multiple connections.
TCP/IP Raw Print Ports
raw-port: Specifies additional ports for printing to TCP port 9100. Valid ports are 3000 to 9000, which are application-dependent.
TCP/IP Access Control
allow: netnum [mask] Makes an entry into the host access list stored on the HP Jetdirect print server. Each entry specifies a host or network of hosts that are allowed to connect to the printer. The format is “allow: netnum [mask]” where netnum is a network number or host IP address, and mask is an address mask of bits applied to the network number and host address to verify access. Up to 10 access list entries are allowed. If there are no entries, all hosts are permitted access. For example, allow: 192.0.0.0 255.0.0.0 allows hosts on network 192. allow: 192.168.1.2 allows a single host. In this case, the default mask 255.255.255.255 is assumed and is not required. allow: 0 This entry clears the host access list. For additional information, see Chapter 7.
TCP/IP Other Settings
syslog-config: Enables or disables syslog server operation on the print server: 0 disables, 1 (default) enables.
syslog-svr: The syslog server’s IP address. It specifies the server that the HP Jetdirect print server sends syslog messages to. For more information, see Appendix A.
syslog-max: Specifies the maximum number of syslog messages that can be sent by the HP Jetdirect print server on a per-minute basis. This setting allows administrators to control the log file size. The default is 10 per minute. If it’s set to zero, the number of syslog messages is not restricted.

Table 3.3 TFTP Configuration File Parameters (4 of 10)

syslog-priority: Controls the filtering of syslog messages sent to the syslog server. The filter range is 0 to 8, with 0 being the most specific and 8 the most general. Only messages that are lower than the filter level specified (or higher in priority) are reported. The default is 8, messages of all priorities are sent. If 0, all syslog messages are disabled.
syslog-facility: A code used to identify the source facility of a message (for example, to identify the source of selected messages during troubleshooting). By default, the HP Jetdirect print server uses LPR as the source facility code, but local user values of local0 through local7 can be used to isolate individual or groups of print servers.
slp-config: Enables or disables the Service Location Protocol (SLP) operation on the print server: 0 disables, 1 (default) enables.
ttl-slp: Specifies the IP multicast "Time To Live" (TTL) setting for Service Location Protocol (SLP) packets. The default value is 4 hops (the number of routers from the local network). The range is 1-15. When set to a -1, multicast capability is disabled.
mdns-config: Enables or disables Multicast Domain Name System (mDNS) services. 0 disables, 1 (default) enables. mDNS is typically used on small networks for IP address and name resolution (through UDP port 5353) where a conventional DNS server is neither used or available.
mdns-service-name: Specifies an alphanumeric string of up to 64 ASCII characters assigned to this device or service. This name is persistent and is used to resolve a particular device or service if socket information (such as the IP address) changes from session to session. Apple Rendezvous will display this service. The default service name is the printer model and the LAN Hardware (MAC) address.
mdns-pri-svc: Specifies the mDNS highest priority service to use for printing.To set this parameter, choose one of the following printing option numbers: **1**: Port 9100 printing **2**: IPP port printing **3**: The default LPD raw queue **4**: The default LPD text queue **5**: The default LPD auto queue **6**: The default LPD binps (binary postscript) queue **7** through **12**: If user-specified LPD queues are defined, corresponds to user-specified LPD queues 5 through 10. The default selection will depend on the printer, typically port 9100 printing or LPD binps.

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ipv4-multicast: Enables or disables the receipt and transmission of IP version 4 multicast packets by the print server. 0 disables, 1 (default) enables.
idle-timeout: The number of seconds that an idle print data connection is allowed to remain open. Since the card supports only a single TCP connection, the idle timeout balances the opportunity of a host to recover or complete a print job against the ability of other hosts to access the printer. The acceptable values range from 0 to 3600 (1 hour). If “0” is typed, the timeout mechanism is disabled. The default is 270 seconds.
user-timeout: An integer (1..3600) that specifies the number of seconds that your Telnet or FTP session can be idle before it will be automatically disconnected. The default is 900 seconds. 0 disables the timeout. **CAUTION:** Small values, such as 1-5, may effectively disable the use of Telnet. A Telnet session may terminate before any changes can be made.
ews-config: Enables or disables the print server’s embedded Web server to change configuration values: 0 disables, 1 (default) enables.
tcp-mss: Specifies the maximum segment size (MSS) that the HP Jetdirect print server will advertise for use when communicating with local subnets (Ethernet MSS=1460 bytes or more) or remote subnets (MSS=536 bytes): 0 (default): All networks are assumed to be local (Ethernet MSS=1460 bytes or more). 1: Use MSS=1460 bytes (or more) for subnets, and MSS=536 bytes for remote networks. 2: All networks are assumed to be remote (MSS=536 bytes), except the local subnet. MSS affects performance by helping to prevent IP fragmentation that may result in data retransmission.
tcp-msl: Specifies the maximum segment life (MSL) in seconds. The range is 5 - 120 seconds. The default is 15 seconds.
telnet-config: If set to 0, this parameter instructs the print server not to allow incoming Telnet connections. To regain access, change the setting in the TFTP configuration file and power cycle the print server, or cold reset the print server to factory default values. If this parameter is set to 1, incoming Telnet connections are allowed.

Table 3.3 TFTP Configuration File Parameters (6 of 10)

default-ip: Specifies the IP address to use when the print server is unable to obtain an IP address from the network during a forced TCP/IP reconfiguration (for example, when powered off/on or manually configured to use BOOTP/DHCP). DEFAULT_IP: sets the legacy default IP address 192.0.0.192. AUTO_IP: sets a link-local IP address 169.254.x.x. The initial setting is determined by the IP address obtained when first powered on.
default-ip-dhcp: Specifies whether DHCP requests will be periodically transmitted when a legacy default IP address 192.0.0.192 or link-local IP address 169.254.x.x has been automatically assigned. 0: Disables DHCP requests. 1 (default): Enables DHCP requests.
web-refresh: Specifies the time interval (1 -99999 seconds) for embedded Web server diagnostic page updates. If set to 0, the refresh rate is disabled.
SNMP
snmp-config: Enables or disables SNMP operation on the print server. 0 disables, 1 (default) enables SNMP. **CAUTION:** Disabling SNMP will disable all SNMP agents (SNMP v1, v2, v3) as well as communications with HP Web Jetadmin. In addition, firmware upgrades through current HP downloading utilities will be disabled.
get-cmnty-name: Specifies a password that determines which SNMP GetRequests the HP Jetdirect print server will respond to. This is optional. If a user-specified get community name is set, the print server will respond to either a user-specified community name or the factory-default. The community name must be ASCII characters. The maximum length is 255 characters.
set-cmnty-name: Specifies a password that determines which SNMP SetRequests (control functions) the HP Jetdirect print server will respond to. The community name of an incoming SNMP SetRequest must match the print server's "set community name" for the print server to respond. (For additional security, you may limit configuration access through the print server's host access list). Community names must be ASCII characters. The maximum length is 255 characters.
auth-trap: Configures the print server to send (on) or not send (off) SNMP authentication traps. Authentication traps indicate that an SNMP request was received, but the community name check failed. The default is "on."

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trap-dest: Enters a host's IP address into the HP Jetdirect print server's SNMP trap destination list. The command format is: trap-dest: *ip-address* [community name] [port number] The default community name is "public"; the default SNMP port number is "162". The port number cannot be specified without a community name. If a "trap-community-name" command is followed by "trap-dest" commands, the trap community name will be assigned to those entries unless a different community name is specified in each "trap-dest" command. To delete the table, use "trap-dest: 0". If the list is empty, the print server does not send SNMP traps. The list may contain up to three entries. The default SNMP Trap Destination List is empty. To receive SNMP traps, the systems listed on the SNMP trap destination list must have a trap daemon to listen to those traps.
IPX/SPX
ipx-config: Enables or disables IPX/SPX protocol operation on the print server: 0 disables, 1 (default) enables.
ipx-unit-name: A user-assigned alphanumeric name assigned to the print server (31 characters maximum). By default, the name will be NPIxxxxxx, where xxxxxx are the last six digits of the LAN hardware address.
ipx-frametype: Specify the IPX frame type setting available for your print server model: AUTO (default), EN_SNAP, EN_8022, EN_8023, EN_II, TR_8022, TR_SNAP.
ipx-sapinterval: Specifies the time interval (1 to 3600 seconds) that the HP Jetdirect print server waits between Service Advertising Protocol (SAP) broadcasts on the network. The default is 60 seconds. 0 disables SAP broadcasts.
ipx-nds-tree: Identifies the name of the Novell Directory Services (NDS) tree for this printer.
ipx-nds-context: An alphanumeric string, up to 256 characters, that specifies the NDS context for the HP Jetdirect print server.
ipx-job-poll: Specifies the time interval (seconds) that the HP Jetdirect print server will wait to check for print jobs in a print queue.

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ipx-banner: Enables or disables printing an IPX banner page. 0 disables banner pages. 1 (default) enables banner pages.
ipx-eoj: Enables or disables IPX end-of-job notification. 0 disables, 1 (default) enables.
ipx-toner-low: Enables or disables IPX toner-low notification. 0 disables, 1 (default) enables.
AppleTalk
appletalk: Enables or disables AppleTalk (EtherTalk) protocol operation on the print server: 0 disables, 1 (default) enables.
name-override: (External print servers only) Specifies the name of the AppleTalk network. Up to 32 characters may be used.
DLC/LLC
dlc/llc: Enables or disables DLC/LLC protocol operation on the print server: 0 disables, 1 (default) enables.
Other Settings
link-type: (10/100 Fast Ethernet) Sets the print server's link speed (10 or 100 Mbps) and communication mode (Full- or Half-Duplex). Selections are AUTO, 100FULL, 100HALF, 10FULL, 10HALF. For AUTO (default), the print server uses autonegotiation to determine the link speed and mode. If autonegotiation fails, then 100HALF is set.
webscan-config: Enables or disables the Web Scan feature on the print server when connected to a supported device. 0 disables, 1 (default) enables.
scan-idle-timeout: Specifies the number of seconds (1 - 3600) that an idle scan connection is allowed to remain open. 0 disables the timeout. The default is 300 seconds.
scan-email-config: Enable or disable the scan-to-email feature in the Web Scan server. 0 disables, 1 (default) enables.

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MFP-config: Enable or disable print server support of the client software provided with your multifunction or all-in-one peripheral. 0 (default): disables client software support (allows printing only). 1: enables client software support (allows printing and scanning).
usb-mode: Specifies the communication mode over the USB port on the HP Jetdirect print server. ● Auto (default): Automatically negotiates and sets the the highest communication mode possible for the attached printer or device. ● MLC: (Multiple Logical Channels) An HP-proprietary communication mode that allows multiple channels of simultaneous print, scan and status communications. ● BIDIR: A standard connection that supports bi-directional communications between the printer and print server. The print server sends print data and receives status from the printer. ● UNIDIR: A standard connection in which data is transferred in one direction only (to the printer).
status-page-lang: Specifies the page description language (PDL) that the print server will use to send the Jetdirect configuration/status page to the printer. ● Auto (default): The PDL is auto-detected when the print server is powered on or after a cold-reset. ● PCL: Hewlett-Packard Printer Control Language ● ASCII: Standard ascii characters ● HPGL2: Hewlett-Packard Graphics Language (v2) ● PS: Postscript language

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Support
support-name: Typically used to identify the name of a person to contact for support of this device.
support-number: Typically used to specify a phone number or extension to call for support of this device.
support-url: A Web URL for product information on this device over the Internet or an intranet.
tech-support-url: A Web URL for technical support over the Internet or an intranet.

Using DHCP

Note For HP Jetdirect *wireless* print servers, this section assumes that a wireless connection to your network has been established.

Dynamic Host Configuration Protocol (DHCP, RFC 2131/2132) is one of several auto configuration mechanisms that the HP Jetdirect print server uses. If you have a DHCP server on your network, the HP Jetdirect print server automatically obtains its IP address from that server and registers its name with any RFC 1001 and 1002-compliant dynamic name services as long as a WINS (Windows Internet Naming Service) server IP address has been specified.

A TFTP (Trivial File Transfer Protocol) configuration file may also be used with DHCP to configure extended parameters. For more information on TFTP parameters, see "Using BOOTP/TFTP".

Note DHCP services must be available on the server. Refer to your system documentation or online help to install or enable DHCP services.

Note If the Jetdirect print server and BOOTP/DHCP server are located on different subnets, IP configuration may fail unless the routing device allows the transfer of DHCP requests between subnets.

UNIX Systems

For more information on setting up DHCP on UNIX systems, see the bootpd man page.

On HP-UX systems, a sample DHCP configuration file (dhcptab) may be located in the `/etc` directory.

Since HP-UX presently does not provide Dynamic Domain Name Services (DDNS) for its DHCP implementations, HP recommends that you set all print server lease durations to “infinite”. This ensures that print server IP addresses remain static until dynamic domain name services are provided.

Windows Systems

HP Jetdirect print servers support IP configuration from a Windows NT or 2000 DHCP server. This section describes how to set up a pool, or “scope,” of IP addresses that the Windows server can assign or lease to any requester. When configured for BOOTP or DHCP operation and powered on, the HP Jetdirect print server automatically sends a BOOTP or DHCP request for its IP configuration. If properly set up, a Windows DHCP server will respond with the print server’s IP configuration data.

Note This information is provided as an overview. For specific information or for additional support, see the information supplied with your DHCP server software.

Note To avoid problems resulting from IP addresses that change, HP recommends that all printers be assigned IP addresses with infinite leases or reserved IP addresses.

Windows NT 4.0 Server

To set up a DHCP scope on a Windows NT 4.0 server, perform the following steps:

1. At the Windows NT server, open the *Program Manager* window and double-click the *Network Administrator* icon.
2. Double-click the **DHCP Manager** icon to open this window.
3. Select **Server** and select **Server Add**.
4. Type the server IP address, then click **OK** to return to the *DHCP Manager* window.
5. In the list of DHCP servers, click on the server you have just added, then select **Scope** and select **Create**.
6. Select **Set up the IP Address Pool**. In the *IP Address Pool* section, set up the IP address range by typing the beginning IP address in the *Start Address* box and the ending IP address in the *End Address* box. Also type the subnet mask for the subnet to which the IP address pool applies.

   The starting and ending IP addresses define the end points of the address pool assigned to this scope.

Note If desired, you can exclude ranges of IP addresses within a scope.

7. In the *Lease Duration* section, select **Unlimited**, then select **OK**.

   HP recommends that all printers be assigned infinite leases to avoid problems resulting from IP addresses that change. Be aware, however, that selecting an unlimited lease duration for the scope causes all clients in that scope to have infinite leases.

   If you want clients on your network to have finite leases, you can set the duration to a finite time, but you should configure all printers as reserved clients for the scope.

8. Skip this step if you have assigned unlimited leases in the previous step. Otherwise, select **Scope** and select **Add Reservations** to set up your printers as reserved clients. For each printer, perform the following steps in the *Add Reserved Clients* window to set up a reservation for that printer:
   a. Type the selected IP address.
   b. Obtain the MAC address or hardware address from the configuration page, and type this address in the *Unique Identifier* box.
   c. Type the client name (any name is acceptable).
   d. Select **Add** to add the reserved client. To delete a reservation, in the *DHCP Manager* window, select **Scope** and select **Active Leases**. In the *Active Leases* window, click on the reservation you want to delete and select **Delete**.
9. Select **Close** to return to the *DHCP Manager* window.
10. Skip this step if you are not planning to use WINS (Windows Internet Naming Service). Otherwise perform the following steps when configuring your DHCP server:
   a. From the *DHCP Manager* window, select **DHCP Options** and select one of the following:

      Scope — if you want Name Services only for the selected scope.

      Global — if you want Name Services for all scopes.
   b. Add the server to the *Active Options* list. From the *DHCP Options* window, select **WINS/NBNS Servers (044)** from the *Unused Options* list. Select **Add**, then select **OK**.

      A warning may appear requesting that you set the node type. You do this in step 10d.
   c. You must now provide the IP address of the WINS server by doing the following:
      - Select **Value**, then **Edit Array**.
      - From the IP Address Array Editor, select **Remove** to delete any undesired addresses previously set. Then type in the IP address of the WINS server and select **Add**.

- Once the address appears in the list of IP addresses, select **OK**. This returns you to the **DHCP Options** window. If the address you have just added appears in the list of IP addresses (near the bottom of the window) return to step 10d. Otherwise, repeat step 10c.

d. In the **DHCP Options** window, select **WINS/NBT Node Type (046)** from the **Unused Options** list. Select **Add** to add the node type to the **Active Options** list. In the **Byte** box, type `0x4` to indicate a mixed node, and select **OK**.

11. Click **Close** to exit to **Program Manager**.

Windows 2000 Server

To set up a DHCP scope on a Windows 2000 server, perform the following steps:

1. Run the Windows 2000 DHCP manager utility. Click **Start**, then select **Settings** and **Control Panel**. Open the **Administrative Tools** folder and run the **DHCP** utility.
2. In the **DHCP** window, locate and select your Windows 2000 server in the DHCP tree.

   If your server is not listed in the tree, select **DHCP** and click the **Action** menu to add the server.
3. After selecting your server in the DHCP tree, click the **Action** menu and select **New Scope**. This runs the **Add New Scope** Wizard.
4. In the **Add New Scope** Wizard, click **Next**.
5. Enter a Name and Description for this scope, then click **Next**.
6. Enter the range of IP addresses for this scope (beginning IP address and ending IP address). Also, enter the subnet mask. then click **Next**.

Note If subnetting is used, the subnet mask defines which portion of an IP address specifies the subnet and which portion specifies the client device. For more information, see Appendix A.

7. If applicable, enter the range of IP addresses within the scope to be excluded by the server. Then click **Next**.

8. Set the IP address lease duration for your DHCP clients. Then click **Next**.

   HP recommends that all printers be assigned reserved IP addresses. This can be accomplished after you set up the scope (see step 11).

9. Select **No** to configure DHCP options for this scope later. Then click **Next**.

   To configure DHCP options now, select **Yes** and click **Next**.

   a. If desired, specify the IP address of the router (or default gateway) to be used by clients. Then click **Next**.

   b. If desired, specify the Domain Name and DNS (Domain Name System) servers for clients. Click **Next**.

   c. If desired, specify WINS server names and IP addresses. Click **Next**.

   d. Select **Yes** to activate the DHCP options now, and click **Next**.

10. You have successfully set up the DHCP scope on this server. Click **Finish** to close the wizard.

11. Configure your printer with a reserved IP address within the DHCP scope:

    a. In the DHCP tree, open the folder for your scope and select **Reservations**.

    b. Click the **Action** menu and select **New Reservation**.

    c. Enter the appropriate information in each field, including the reserved IP address for your printer. (Note: the MAC address for your HP Jetdirect-connected printer is available on the HP Jetdirect configuration page.)

    d. Under "Supported types", select **DHCP only**, then click **Add**. (Note: Selecting **Both** or **BOOTP only** will result in a configuration through BOOTP due to the sequence in which HP Jetdirect print servers initiate configuration protocol requests.)

    e. Specify another reserved client, or click **Close**. The reserved clients added will be displayed in the Reservations folder for this scope.

12. Close the DHCP manager utility.

NetWare Systems

NetWare 5.x servers provide DHCP configuration services for network clients, including the HP Jetdirect print server. To set up DHCP services on a NetWare server, refer to Novell documentation and support.

To Discontinue DHCP Configuration

CAUTION Changes to an IP address on your HP Jetdirect print server may require updates to printer or system printing configurations for clients or servers.

If you do not want your HP Jetdirect print server configured through DHCP, you must reconfigure the print server with a different configuration method.

1. (For internal print servers) If you use the printer control panel to set Manual or BOOTP configuration, then DHCP will not be used.
2. You can use Telnet to set Manual (status indicates “User Specified”) or BOOTP configuration, then DHCP will not be used.
3. You can manually modify the TCP/IP parameters through a supported Web browser using the Jetdirect embedded Web server or HP Web Jetadmin.

If you change to BOOTP configuration, the DHCP-configured parameters are released and the TCP/IP protocol is initialized.

If you change to Manual configuration, the DHCP-configured IP address is released and the user-specified IP parameters are used. **Therefore, if you manually provide the IP address, you should also manually set all of the configuration parameters, such as subnet mask, default gateway, and idle timeout.**

Note If you choose to re-enable a DHCP configuration, the print server will acquire its configuration information from a DHCP server. This means that when you choose DHCP and complete your configuration session (using Telnet, for example), the TCP/IP protocol for the print server is re-initialized and all current configuration information is deleted. The print server then attempts to acquire new configuration information by sending DHCP requests on the network to a DHCP server.

For DHCP configuration through Telnet, refer to "Using Telnet" in this chapter.

Using RARP

Note For HP Jetdirect *wireless* print servers, this section assumes that a wireless connection to your network has been established.

This section describes how to configure the print server using the Reverse Address Resolution Protocol (RARP) on UNIX and Linux systems.

This setup procedure enables the RARP daemon running on your system to respond to a RARP request from the HP Jetdirect print server and to supply the IP address to the print server.

1. Turn the printer off.
2. Log onto your UNIX or Linux system as a superuser.
3. Make sure the RARP daemon is running on your system by typing the following command at the system prompt:

   `ps -ef | grep rarpd` (Unix)

   `ps ax | grep rarpd` (BSD or Linux)
4. The system response should be similar to the following:

   ```
   861 0.00.2  24  72  5  14:03  0:00  rarpd -a
   860 0.00.5  36 140  5  14:03  0:00  rarpd -a
   ```
5. If the system does not display a process number for the RARP daemon, see the *rarpd* man page for instructions on starting the RARP daemon.
6. Edit the `/etc/hosts` file to add your designated IP address and node name for the HP Jetdirect print server. For example:

   `192.168.45.39 laserjet1`

7. Edit the `/etc/ethers` file (`/etc/rarpd.conf` file in HP-UX 10.20) to add the LAN hardware address/station address (from the configuration page) and the node name for the HP Jetdirect print server. For example:

   ```
   00:01:E6:a8:b0:00 laserjet1
   ```

Note If your system uses Network Information Service (NIS), you need to incorporate changes to the NIS host and ethers databases.

8. Turn the printer on.
9. To verify that the card is configured with the correct IP address, use the ping utility. At the prompt, type:

   ```
   ping <IP address>
   ```

   where `<IP address>` is the assigned address from RARP.

10. If ping does not respond, see Chapter 8.

Using the arp and ping Commands

Note For HP Jetdirect *wireless* print servers, this section assumes that a wireless connection to your network has been established.

You can configure an HP Jetdirect print server with an IP address using an ARP (Address Resolution Protocol) command from a supported system. The protocol is not routable, that is, the workstation from which the configuration is made must be located on the same network segment as the HP Jetdirect print server.

Using the arp and ping commands with HP Jetdirect print servers requires the following:

- Windows NT/2000/XP or UNIX system configured for TCP/IP operation
- HP Jetdirect firmware version x.20.00 or later
- A legacy default IP address 192.0.0.192 has been set on the print server
- The LAN hardware (MAC) address of the HP Jetdirect print server (specified on an HP Jetdirect configuration page, or on a label attached to HP Jetdirect external print servers)

Note On some systems, superuser rights may be required for the `arp` command.

After an IP address is assigned through `arp` and `ping` commands, use other tools (such as Telnet, embedded Web server, or HP Web Jetadmin software) to configure other IP parameters.

To configure a Jetdirect print server, use the following commands:

```
arp -s <IP address> <LAN hardware address>

ping <IP address>
```

where `<IP address>` is the desired IP address to be assigned to the print server. The `arp` command writes the entries to the arp cache on the workstation, and the `ping` command configures the IP address on the print server.

Depending on the system, the LAN hardware address may require a specific format.

For example:

- For Windows NT 4.0, 2000, XP

  `arp -s 192.168.45.39 00-01-E6-a2-31-98`

  `ping 192.168.45.39`

- For UNIX

  `arp -s 192.168.45.39 00:01:E6:a2:31:98`

  `ping 192.168.45.39`

Note

Once the IP address has been set on the print server, additional `arp` and `ping` commands will be ignored. Once the IP address is configured, `arp` and `ping` cannot be used unless the print server is reset to factory values (see Chapter 8).

On UNIX systems, the `arp -s` command may vary between different systems.

Some BSD-based systems expect the IP address (or host name) in reverse order. Other systems may require additional parameters. See your system documentation for specific command formats.

Using Telnet

Note For HP Jetdirect *wireless* print servers, this section assumes that a wireless connection to your network has been established.

This section describes how to configure the print server (firmware version x.25.01 or greater) using Telnet.

Although a Telnet connection may be protected by an administrator password, Telnet connections are not secure. For networks with high security levels, Telnet connections can be disabled on the print server using other tools (for example, TFTP, embedded Web server, or HP Web Jetadmin software).

Creating a Telnet Connection

To use Telnet commands with the HP Jetdirect print server, a route must be available from your workstation to the print server. If the print server and your computer must have a similar IP address, that is, the network portion of their IP addresses match, chances are that a route will exist. For information on IP address structure, see Appendix A.

If their IP addresses do not match, then you can either change your workstation's IP address to match, or you can try an operating system command to create a route to the print server. (For example, if the print server is configured with a legacy default IP address 192.0.0.192, a route will not likely exist.)

On Windows systems, you can use aroute command at a Windows command (DOS) prompt to create a route to the print server.

For information on system command prompts, see your Windows online help. On Windows NT systems, the command prompt utility is in the **Programs** folder (click **Start**, **Programs**, **Command Prompt**). On Windows 2000/XP systems, it is in the **Accessories** folder in the **Programs** folder.

To use the route command, you will also need the IP address of your workstation. To view it, you can enter the appropriate command at the command prompt:

`C:\> ipconfig` (on Windows NT/2000/XP)

`C:\> winipconfig` (on Windows 98)

To create a route from the system command prompt, enter the following command:

```
route add <Jetdirect IP Address>   <system IP Address>
```

where `<Jetdirect IP address>` is the IP address configured on the HP Jetdirect print server, and `<system IP address>` is the IP address of the workstation's network card that is attached to the same physical LAN as the print server.

For example, to create a route from your workstation with IP address 169.254.2.1 to a print server with a default IP address of 192.0.0.192, try this command:

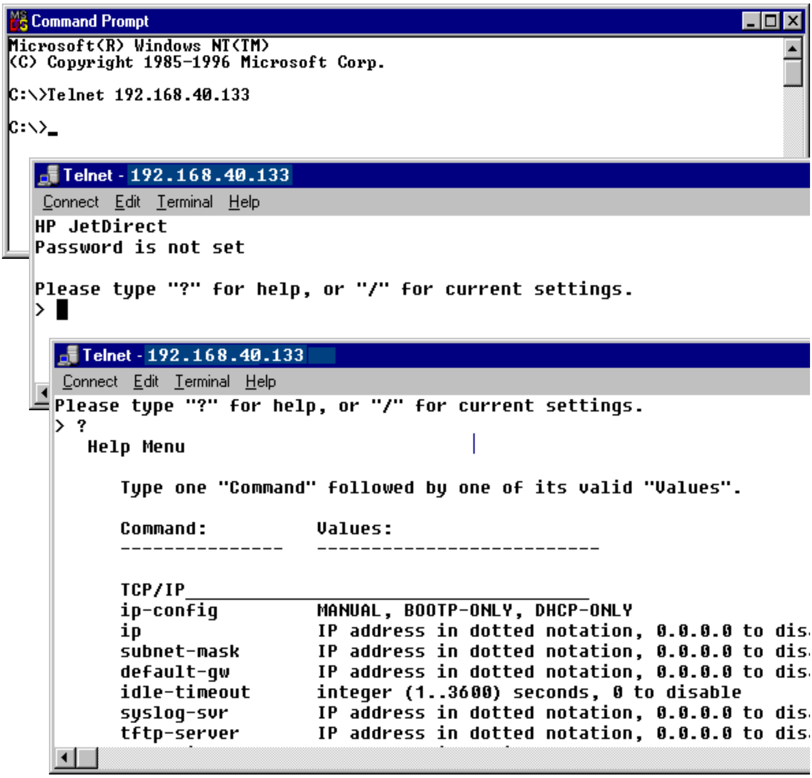
```
route add 192.0.0.192    169.254.2.1
```

CAUTION Using Telnet to manually set an IP address will override dynamic IP configuration (such as BOOTP, DHCP, or RARP), resulting in a static configuration. In a static configuration, the IP values are fixed and the operation of BOOTP, DHCP, RARP and other dynamic configuration methods may no longer function.

Whenever you are manually changing an IP address, you should also reconfigure the subnet mask and default gateway at the same time.

A Typical Telnet Session

Initiating a typical Telnet session is illustrated below.



To set configuration parameters, you must set up a Telnet session from your system to the HP Jetdirect print server.

1. Type the following at the system prompt:

   `telnet <IP address>`

   where `<IP address>` is the IP address listed on the Jetdirect configuration page. See Chapter 9.

2. A connection to the HP Jetdirect print server will be displayed. If the server responds with "`connected to IP address`", press **Enter** twice to make sure that the Telnet connection is initialized.

3. If prompted for a user name and password, enter the correct values.

   By default, the Telnet interface does not require a user name or password. If an administrator password has been set, you will be prompted for a user name and this password before you can enter and save Telnet command settings.

4. By default, a Command Line interface is provided. To configure parameters using a Menu interface, enter **Menu**. For more information, see "User Interface Options".

For a list of supported commands and parameters, see "Telnet Commands and Parameters".

User Interface Options

The HP Jetdirect print server provides two interface options to enter Telnet commands: a Command Line Interface (Default) and a Menu Interface.

Command Line Interface (Default)

Using the Telnet command line interface, you can set configuration parameters using the following procedures:

Note During a Telnet session, enter `?` to view available configuration parameters, the correct command format, and a list of commands.

To list additional (or advanced) commands, enter the command `advanced` befored entering `?..`

To display current configuration information, enter `/`.

---

1. At the Telnet prompt ">" type:

   `<parameter>: <value>`

   then press **Enter**, where `<parameter>` refers to the configuration parameter you are defining, and `<value>` refers to the definitions you are assigning to that parameter. Each parameter entry is followed by a carriage return.

   See Table 3.4 for configuration parameters (firmware version x.25.00 or later).

2. Repeat the previous step to set any additional configuration parameters.

3. When you have finished typing the configuration parameters, type `exit` or `quit` (depending on your system).

   When prompted whether to save settings that you have changed, enter `Y` (default) for Yes, or `N` for No.

   If you enter `save` instead of `exit` or `quit`, you will not be prompted to save settings.

Telnet Commands and Parameters. Table 3.4 lists the available Telnet commands and parameters.

Note

If a parameter is supplied dynamically (for example, from a BOOTP or DHCP server), its value cannot be changed using Telnet without first setting Manual configuration. To set Manual configuration, see the `ip-config` command.

Whenever you are manually changing an IP address, you should also reconfigure the subnet mask and default gateway at the same time.

Table 3.4 Telnet Commands and Parameters (1 of 18)

User Control Commands	
Command	**Description**
?	Displays the Help and Telnet commands.
/	Displays current values.
menu	Displays the Menu Interface for access to configuration parameters.
advanced	Enables the Advanced commands. Help (?) will include the Advanced commands in the list.
general	Disables the Advanced commands. Help (?) will not include Advanced commands (default).
save	Save the configuration values and exit the session.
exit	Exit the session.
export	Export the settings to a file for editing, and importing through Telnet or TFTP (this command is only supported by systems, such as UNIX, that support input/output redirection).
General Settings	
Command	**Description**
passwd	Set the administrator password (shared with the embedded Web server and HP Web Jetadmin). For example, "passwd jd1234 jd1234" sets the password to jd1234. Note that "jd1234" is entered twice for confirmation. Up to 16 alphanumeric characters may be used. When initiating the next Telnet session, you will be prompted for a user name and this password. To clear the password, enter the command without password and confirmation entries. Passwords may be cleared by a cold reset.

Table 3.4 Telnet Commands and Parameters (2 of 18)

sys-location	Alpha-numeric string (up to 255 characters), typically used to identify a location.
sys-contact	Alpha-numeric string (up to 255 characters), typically used to identify the name of a network or device administrator.
ssl-state	Sets the print server's security level for Web communications: 1 (default): Forced redirection to the HTTPS port. Only HTTPS (secure HTTP) communications can be used. 2: Disable forced redirection to HTTPS. Both HTTP and HTTPS communications can be used.
security-reset	Reset security settings on the print server to factory default values. 0 (default) does not reset, 1 resets the security settings.
Wireless 802.11Main Settings	
Command	**Description**
network-type	Specify the 802.11 wireless network topology: **Infrastructure**: The print server will communicate on the network with other wired or wireless devices through an Access Point. **Ad Hoc**: (default) The print server will communicate with other wireless devices directly, without using an Access Point.
desired-ssid	Specify the desired Service Set Identifier (SSID), or Network Name, for the print server. Up to 32 alphanumeric characters may be used. The factory-default SSID is `hpsetup` in Ad Hoc mode. An Infrastructure network SSID of `hpsetup` should not be used. If the ssid command is issued without an entry (a blank SSID), the desired SSID will be assigned <AUTO>, where it will associate with the first network that matches its authentication settings.
encryption	Specify the use of encryption. 0 (default) disables, 1 enables.
wep-key-method	Specify the format for WEP key entry. WEP key entries must be of the proper length. **ASCII**: (default) Use alphanumeric ASCII characters (0 - 9, a - z, A - Z). For 40/64-bit encryption, enter 5 characters. For 104/128-bit encryption, enter 13 characters. ASCII entries are case-sensitive. **HEX**: Use hexadecimal digits (0 - 9, a - f, A - F). For 40/64-bit encryption, enter10 hexadecimal digits. For 104/128-bit encryption, enter 26 hexadecimal digits. HEX entries are not case-sensitive.

Table 3.4 Telnet Commands and Parameters (3 of 18)

wep-key	Specify a static WEP (Wired Equivalent Privacy) encryption key. The print server can store up to four WEP keys using four key positions (Key 1, 2, 3, 4). To enter a WEP key, specify the key position followed by the encryption key value. For example, wep-key 1 0123456789net assigns Key 1 with a 128-bit WEP key specified by the value 0123456789net. You can use the `wep-key-method` command to specify the format of the key value (hexadecimal digits, or alphanumeric ASCII characters). Alternatively, you can insert an optional parameter (ASCII or HEX) after the key position. For example, wep-key 1 ASCII 0123456789net assigns Key 1 with a 128-bit WEP key specified by the alphanumeric ASCII characters 0123456789net. When assigning static WEP keys, ensure that key positions and key values match other wireless devices on the network. Ensure that all key values entered are of the same length, and that WEP key lengths use the proper number of characters or digits.
transmit-key	Specify the WEP key position (1, 2, 3, 4) that the print server will use for encrypted communications. For example, transmit-key 2 specifies that Key 2 will be used for encrypted communications.
desired-channel	(Ad Hoc) Specify a desired channel that the print server will use for Ad Hoc network association requests. **10**: (default) Use channel 10 (2457 MHz). **11**: Use Channel 11 (2462 MHz). The print server will use this channel to broadcast its availability if it fails to detect and associate with the specified Ad Hoc network on any channel.
auth-type	Specify a link-based authentication method for the print server before network access is allowed. **Open**: (default) Use Open System authentication if your wireless network does not require authentication for network access. However, your network may still use encryption keys for data security. **Shared_Key**: Use Shared Key authentication if your network requires that each device be configured with the same secret WEP key for network access. The use of the Shared_Key option is not valid with the `wpa-auth-type` command settings (802.1x or PSK).

Table 3.4 Telnet Commands and Parameters (4 of 18)

server-auth	This command requires that you specify a dynamic encryption option (`dynamic-encrypt` command) and EAP 802.1x authentication (`wpa-auth-type` command). Use this command to specify server-based authentication methods used on your network. For a brief description of supported authentication protocols, see Chapter 1. **None**: (default) Server-based network authentication is not used. **EAP_MD5**: An authentication method that uses 802.1x EAP and MD5 (Message-Digest Algorithm 5, RFC 1321). It requires that a user name and password be configured on the device. Use the `svr-auth-user` and `svr-auth-pass` commands to specify a user name and password, respectively. **EAP_TLS**: An authentication method that uses 802.1x EAP-TLS (Extensible Authentication Protocol - Transport Layer Security, RFC 2716). It requires a user name and an installed X.509-compliant digital certificate for device validation. In addition, a CA (Certificate Authority) certificate used to validate the authentication server must be installed. Use the `svr-auth-user` command to specify a user name. To install certificates, use the embedded Web server. See Chapter 4. **LEAP**: An authentication method that uses LEAP (Lightweight Extensible Authentication Protocol). LEAP is a Cisco Systems, Inc. proprietary protocol. LEAP requires a user name and password. Use the `svr-auth-user` and `svr-auth-pass` commands to specify a user name and password, respectively. **PEAP**: An authentication method that uses PEAP (Protected Extensible Authentication Protocol). PEAP requires a user name and password for client validation. In addition, a CA (Certificate Authority) certificate used to validate the authentication server must be installed. Use the `svr-auth-user` and `svr-auth-pass` commands to specify a user name and password, respectively. To install certificates, use the embedded Web server. See Chapter 4. **EAP_TTLS**: An authentication method that uses TTLS (Tunneled Transport Layer Security). EAP-TTLS is an EAP-TLS extension that also uses X.509-compliant digital certificates. TTLS requires a user name and password for client validation. In addition, a CA (Certificate Authority) certificate used to validate the authentication server must be installed. Use the `svr-auth-user` and `svr-auth-pass` commands to specify a user name and password, respectively. To install certificates, use the embedded Web server. See Chapter 4.
svr-auth-user	Specify a user name for server-based authentication. Up to 128 alphanumeric characters may be used.

Table 3.4 Telnet Commands and Parameters (5 of 18)

svr-auth-pass	Specify a password for server-based authentication. Up to 128 alphanumeric characters may be used.
svr-auth-id	Specify the CA certificate character string that will be used to identify and validate the authentication server. This string will be compared to an identification string received from the authentication server. For string comparison, you can specify whether an exact match is required: **RIGHT_MOST** (default): The string entry will be compared to the right-most characters in the CA certificate string. **USE_EXACT**: The string entry must exactly match the authentication server's string.
wpa-auth-type	This command is not compatible with the Shared Key authentication option in the `auth-type` command. Use this command to specify a supported EAP authentication type: **802.1x**: Select this option on an EAP network that uses an authentication server. Use the `server-auth` command to specify the EAP/802.1x protocols used on your network. Use the `dynamic-encrypt` command to specify a dynamic encryption option. **PSK**: Select this option on EAP networks where an authentication server is not used. Instead, a Pre-shared key provides device authentication. A Pre-shared key is generated when you specify a network pass-phrase using the `psk-passphrase` command. The `dynamic-encrypt` command should be set to the **Robust** option.
psk-passphrase	Specify a pass-phrase that is used to generate a network Pre-shared key. A pass-phrase must be from 8 to 63 ASCII characters in the hexadecimal range 21 through 7E (characters 0-9, a-z, A-Z and numerous special characters including !, @, #, $, %, ^, &, (,), _, +, =, -, {, }, [,], \, /, ", <, >, ?, ", ', ~).
dynamic-encrypt	Select a supported dynamic encryption option: **Basic**: Dynamic WEP encryption is supported. **Robust**: Dynamic Wi-Fi Protected Access (WPA) and WEP encryption protocols are supported. Use the `wpa-auth-type` command to select a compatible EAP authentication type: ● For EAP/PSK authentication, the print server should use Robust encryption (WPA encryption protocols). ● For EAP/802.1x authentication (LEAP only), the print server should use Basic encryption. ● For EAP/802.1x authentication (PEAP, TLS, TTLS only), the print server may use either Basic encryption or Robust encryption depending on your network. Dynamic encryption protocols are under the control of the authentication server and also must be supported by the Access Point.

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802.11 Wireless Diagnostics	
Command	**Description**
Current SSID	(Read-only parameter) The network name (SSID) to which the wireless print server connected.
Current Channel	(Read-only parameter) The channel that the wireless print server is currently using.
Signal Strength	(Read-only parameter) The strength of the radio signal received by the print server. **<blank>**: No radio signal detected while the print server is scanning. **No Signal**: No radio signal detected on any channel. **Poor/Marginal/Good/Excellent**: Indicates the detected signal strength level.
Access Point Mac	(Read-only parameter) The Media Access Control (MAC) address of the Access Point used for Infrastructure mode communications. For example, 00:a0:f8:38:7a:f7 specifies that the Access Point with MAC address 00a0f8387af7 was used for communicating on the network.
TCP/IP Main Settings	
Command	**Description**
host-name	Alphanumeric string (up to 32 characters), to assign or change the name of the network device. For example, "host-name printer1" assigns the name "printer1" to the device.
ip-config	Specify the configuration method: **manual**: The print server will wait for IP parameters using manual tools (such as Telnet, embedded Web server, control panel, installation/management software). Status will be `User Specified`. **bootp**: The print server will send BOOTP requests on the network for dynamic IP configuration. **dhcp**: The print server will send DHCP requests on the network for dynamic IP configuration.
ip	IP address for the print server, in dotted notation. For example: `ip-config manual` `ip 192.168.45.39` where `ip-config` specifies manual configuration and `ip` manually sets the IP address 192.168.45.39 on the print server. Specifying 0.0.0.0 clears the IP address. If you exit and save a new IP address, it must be specified on the next Telnet connection.

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subnet-mask	A value (in dotted notation) that identifies the network and host portions of an IP address in received messages. For example, `subnet-mask 255.255.255.0` stores the subnet mask value 255.255.255.0 on the print server. The value 0.0.0.0 disables the subnet mask. For more information see Appendix A.
default-gw	The IP address of a default gateway, in dotted notation. For example, `default-gw 192.168.40.1` assigns 192.168.40.1 as the IP address of the default gateway for the print server. **Note:** If the HP Jetdirect print server is configured by DHCP and you manually change the subnet mask or the default gateway address, you should manually change the print server's IP address. This will release the DHCP-assigned address back to the DHCP IP address pool.
Config Server	(Read-only parameter) The IP address of the server (such as a BOOTP or DHCP server) that last configured the IP address on the HP Jetdirect print server.
TFTP Server	(Read-only parameter) The IP address of the TFTP server that provided TFTP parameters to the HP Jetdirect print server.
TFTP Filename	(Read-only parameter) The path and TFTP filename on the TFTP server. For example, hpnp/printer1.cfg
domain-name	The domain name for the device. For example, `domain-name support.hp.com` assigns `support.hp.com` as the domain name. The domain name does not include the host name; it is not the Fully Qualified Domain Name (such as printer1.support.hp.com).
dns-svr	IP address of the DNS (Domain Name System) server.
pri-wins-svr	The IP address of the primary Windows Internet Name Service (WINS) server, in dotted notation.
sec-wins-svr	The IP address of the secondary Windows Internet Name Service (WINS) server, in dotted notation.
smtp-svr	(SMTP Mail Server) The IP address of the outgoing e-mail Simple Mail Transport Protocol (SMTP) server, for use with supported Scan devices.

Table 3.4 Telnet Commands and Parameters (8 of 18)

TCP/IP Print Options	
Command	**Description**
9100-printing	Enables or disables printing to TCP port 9100 on the print server. 0 disables, 1 (default) enables.
ftp-printing	Enables or disables the ability to print through FTP. 0 disables, 1 (default) enables. (TCP ports 20, 21)
ipp-printing	Enables or disables the ability to print using IPP. 0 disables, 1 (default) enables. (TCP port 631)
lpd-printing	Enables or disables the ability to print using LPD. 0 disables, 1 (default) enables.(TCP port 515)
banner	Enables or disables printing an LPD banner page. 0 disables banner pages. 1 (default) enables banner pages.
interlock	Specifies whether an acknowledgement (ACK) on all TCP packets is required before the printer is allowed to close a Port 9100 print connection. To accommodate multiport print servers, a Port Number and Option value are specified. Port Numbers can be 1 (default), 2, or 3. Option value 0 (default) disables interlock, 1 enables. For example, `interlock 2 1` specifies Port 2, interlock enabled.
mult-tcp-conn	(Restrict Mult Prt) Enables or disables multiple TCP connections. 0 (default): allows multiple connections. 1: disables multiple connections.
buffer-packing	Enables or disables buffer packing for TCP/IP packets. 0 (default): is normal, the data buffer is packed before sending to the printer. 1: disables buffer packing, data is sent to the printer as it is received.
write-mode	Controls the setting of the TCP PSH flag for device-to-client data transfers. 0 (default): disables this option, flag is not set. 1: all-push option. The push bit is set in all data packets. 2: eoi-push option. The push bit is set only for data packets that have an End-of-Information flag set.
TCP/IP LPD Queues	
Command	**Description**
addq	Adds a user-defined queue. The queue name (up to 32 displayable ASCII characters), prepend string name, append string name, and processing queue (typically, RAW) must be specified in the command line. Up to six user-defined queues may be added.
deleteq	Delete a user-specified queue. The queue name must be specified in the deleteq command line.

Table 3.4 Telnet Commands and Parameters (9 of 18)

defaultq	Name of the queue to be used if the queue specified for a print job is unknown. By default, the default queue is AUTO.
addstring	Adds a user-defined character string that may be prepended or appended to print data. Up to eight character strings may be specified. A string name and the character string contents are specified in the addstring command line.
deletestring	Deletes a user-defined string. The string name is specified in the deletestring command line.
TCP/IP Raw Print Ports	
Command	**Description**
raw-port	Specifies additional ports for printing to TCP port 9100. Valid ports are 3000 to 9000, which are application-dependent. Up to two ports can be specified.
TCP/IP Access Control	
Command	**Description**
allow	Makes an entry into the host access list stored on the HP Jetdirect print server. Each entry specifies a host or network of hosts that are allowed to connect to the printer. The format is "allow netnum [mask]" where netnum is a network number or host IP address, and mask is an address mask of bits applied to the network number and host address to verify access. Up to 10 access list entries are allowed. If there are no entries, all hosts are permitted access. For example, `allow 192.0.0.0   255.0.0.0` allows hosts on network 192. `allow 192.168.1.2` allows a single host. In this case, the default mask 255.255.255.255 is assumed and is not required. `allow 0` clears the host access list. For additional information, see Chapter 7.
TCP/IP Other Settings	
Command	**Description**
syslog-config	Enables or disables syslog server operation on the print server: 0 disables, 1 (default) enables. (UDP port 514)
syslog-svr	The syslog server's IP address in dotted notation. It specifies the server that the HP Jetdirect print server sends syslog messages to. For example, `syslog-svr: 192.168.40.1` assigns 192.168.40.1 as the IP address of that server. For more information, see Appendix A.

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syslog-max	Specifies the maximum number of syslog messages that can be sent by the HP Jetdirect print server on a per-minute basis. This setting allows administrators to control the log file size. The default is 10 per minute. If it's set to zero, the number of syslog messages is not restricted.
syslog-priority	Controls the filtering of syslog messages sent to the syslog server. The filter range is 0 to 8, with 0 being the most specific and 8 the most general. Only messages that are lower than the filter level specified (or higher in priority) are reported. The default setting is 8, where messages of all priorities are sent. If 0, all syslog messages are disabled.
syslog-facility	A code used to identify the source facility of a message (for example, to identify the source of selected messages during troubleshooting). By default, the HP Jetdirect print server uses LPR as the source facility code, but local user values of local0 through local7 can be used to isolate individual or groups of print servers.
slp-config	Enables or disables the Service Location Protocol (SLP) operation on the print server: 0 disables, 1 (default) enables. SLP is used by selected HP software applications (through UDP port 427) to automate device discovery.
mdns-config	Enables or disables Multicast Domain Name System (mDNS) services. 0 disables, 1 (default) enables. mDNS is typically used on small networks for IP address and name resolution (through UDP port 5353) where a conventional DNS server is not available.
mdns-service-name	Specifies an alphanumeric string of up to 64 ASCII characters assigned to this device or service. This name is persistent and is used to resolve a particular device or service if socket information (such as the IP address) changes from session to session. Apple Rendezvous will display this service. The default service name is the printer model and the LAN Hardware (MAC) address.
mDNS Domain Name	(Read-only parameter) Specifies the mDNS domain name assigned to the device, in the form <host name>.local. If a user-specifed host name has not been assigned, the default host name NPIxxxxxx is used, where xxxxxx are the last 6 digits of the LAN hardware (MAC) address.

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mdns-pri-svc	Specifies the mDNS highest priority service to use for printing.To set this parameter, choose one of the following printing option numbers: **1**: Port 9100 printing **2**: IPP port printing **3**: The default LPD raw queue **4**: The default LPD text queue **5**: The default LPD auto queue **6**: The default LPD binps (binary postscript) queue **7** through **12**: If user-specified LPD queues are defined, corresponds to user-specified LPD queues 5 through 10. The default selection will depend on the printer, typically port 9100 printing or LPD binps.
ttl-slp	Specifies the IP multicast “Time To Live” (TTL) setting for Service Location Protocol (SLP) packets. The default value is 4 hops (the number of routers from the local network). The range is 1-15. When set to a -1, multicast capability is disabled.
ipv4-multicast	Enables or disables the receipt and transmission of IP version 4 multicast packets by the print server. 0 disables, 1 (default) enables.
idle-timeout	An integer (1..3600) that specifies the number of seconds an idle print data connection is allowed to remain open. For example, `idle-timeout 120` assigns 120 seconds as the desired idle timeout value. The default is 270 seconds. If set to 0, the connection will not terminate and other hosts will not be able to make a connection.
user-timeout	An integer (1..3600) that specifies the number of seconds that your Telnet or FTP session can be idle before it will be automatically disconnected. The default is 900 seconds. 0 disables the timeout. **CAUTION:** Small values, such as 1-5, may effectively disable the use of Telnet. A Telnet session may terminate before any changes can be made.
cold-reset	Sets TCP/IP factory default settings. After a cold reset, power cycle the print server. Parameters for other subsystems, such as IPX/SPX or AppleTalk, are not affected.
ews-config	Enables or disables the print server’s embedded Web server. 0 disables, 1 (default) enables. For more information, see Chapter 4.

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tcp-mss	Specifies the maximum segment size (MSS) that the HP Jetdirect print server will advertise for use when communicating with local subnets (Ethernet MSS=1460 bytes or more) or remote subnets (MSS=536 bytes): **0**: (default) All networks are assumed to be local (Ethernet MSS=1460 bytes or more). **1**: Use MSS=1460 bytes (or more) for subnets, and MSS=536 bytes for remote networks. **2**: All networks are assumed to be remote (MSS=536 bytes), except the local subnet. MSS affects performance by helping to prevent IP Fragmentation that may result in data retransmission.
tcp-msl	Specifies the maximum segment life (MSL) in seconds. The range is 5 - 120 seconds. The default is 15 seconds.
default-ip	Specifies the IP address to use when the print server is unable to obtain an IP address from the network during a forced TCP/IP reconfiguration (for example, when powered off/on or manually configured to use BOOTP/DHCP). DEFAULT_IP: sets the legacy default IP address 192.0.0.192. AUTO_IP: sets a link-local IP address 169.254.x.x. The initial setting is determined by the IP address obtained when first powered on.
default-ip-dhcp	Specifies whether DHCP requests will be periodically transmitted when a legacy default IP address 192.0.0.192 or link-local IP address 169.254.x.x has been automatically assigned. 0: Disables DHCP requests. 1 (default): Enables DHCP requests.
TCP/IP Diagnostics	
Command	**Description**
Last Config IP	(Read-only parameter) The IP address of the system from which the HP Jetdirect print server's IP address was configured.
TCP Conns Refused	(Read-only parameter) The number of client TCP connections that are refused by the print server.
TCP Access Denied	(Read-only parameter) The number of times that client systems were denied access to the print server because there was no allowable entry in the print server's host access list.
DHCP Lease Time	(Read-only parameter) DHCP IP address lease duration time (seconds).
DHCP Renew Time	(Read-only parameter) DHCP T1 timeout, specifying the DHCP lease renewal time (seconds).

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DHCP Rebind Time	(Read-only parameter) DHCP T2 timeout, specifying the DHCP lease rebind time (seconds).
SNMP Main Settings	
Command	**Description**
snmp-config	Enables or disables SNMP operation on the print server. 0 disables, 1 (default) enables SNMP. **CAUTION:** Disabling SNMP will disable all SNMP agents (SNMP v1, v2, v3) as well as communications with management applications, such as HP Web Jetadmin. In addition, firmware upgrades through current HP downloading utilities will be disabled.
get-cmnty-name	Specifies a password that determines which SNMP GetRequests the HP Jetdirect print server will respond to. This is optional. If a user-specified get community name is set, the print server will respond to either a user-specified community name or the factory-default. The community name must be ASCII characters. The maximum length is 255 characters.
set-cmnty-name	Specifies a password that determines which SNMP SetRequests (control functions) the HP Jetdirect print server will respond to. The community name of an incoming SNMP SetRequest must match the print server's "set community name" for the print server to respond. (For additional security, you may limit configuration access through the print server's host access list.) Community names must be ASCII characters. The maximum length is 255 characters.
default-get-cmnty	Enables or disables the default Get community name. 0 disables, 1 (default) enables. Disabling this parameter may prohibit communications with SNMP management applications.
SNMP Traps	
Command	**Description**
auth-trap	Configures the print server to send (on) or not send (off) SNMP authentication traps. Authentication traps indicate that an SNMP request was received, but the community name check failed. 0 is off, 1 (default) is on.

Table 3.4 Telnet Commands and Parameters (14 of 18)

trap-dest	Enters a host IP address into the HP Jetdirect print server's SNMP trap destination list. The command format is: trap-dest: *ip-address* [community name] [port number] The default community name is 'public'; the default SNMP port number is '162'. The port number cannot be specified without a community name. To delete the table, use 'trap-dest: 0'. If the list is empty, the print server does not send SNMP traps. The list may contain up to three entries. The default SNMP Trap Destination List is empty. To receive SNMP traps, the systems listed on the SNMP trap destination list must have a trap daemon to listen to those traps.
IPX/SPX Settings	
Command	**Description**
ipx-config	Enables or disables IPX/SPX protocol operation on the print server. 0 disables, 1 (default) enables. For example, `ipx-config 0` will disable IPX/SPX operation.
ipx-unitname	(Print Server Name) A user-assigned alphanumeric name assigned to the print server (31 characters maximum). By default, the name will be NPIxxxxxx, where xxxxxx are the last six digits of the LAN hardware address.
Address	(Read-only parameter) Identifies the IPX network and node numbers detected on the network, in the form NNNNNNN:hhhhhhhh (hexadecimal), where NNNNNNNN is the network number and hhhhhhhh is the LAN hardware address of the print server.
ipx-frametype	Specifies the IPX frame type settings available for your print server model: AUTO (default), EN_SNAP, EN_8022, EN_8023, EN_II, TR_8022, TR_SNAP. For more information, see Chapter 9.
ipx-sapinterval	Specifies the time interval (1 to 3600 seconds) that the HP Jetdirect print server waits between Service Advertising Protocol (SAP) broadcasts on the network. The default is 60 seconds. 0 disables SAP broadcasts.
ipx-nds-tree	An alphanumeric string, up to 31 characters, that specifies the NDS tree name for the print server.
ipx-nds-context	An alphanumeric string, up to 256 characters, that specifies the NDS context for the HP Jetdirect print server.
ipx-job-poll	Specifies the time interval (1 to 255 seconds) that the HP Jetdirect print server will wait to check for print jobs in a print queue. The default is 2 seconds.
ipx-banner	Enables or disables printing an IPX banner page through Printer Job Language (PJL). 0 disables banner pages. 1 (default) enables banner pages.
ipx-eoj	Enables or disables IPX end-of-job notification through PJL. 0 disables, 1 (default) enables.

Table 3.4 Telnet Commands and Parameters (15 of 18)

ipx-toner-low	Enables or disables IPX toner-low notification through PJL. 0 disables, 1 (default) enables.
source-route	(Token Ring only) Configures the HP Jetdirect print server with the IPX/SPX source routing used on the network. auto (default): Source routing is automatically sensed from the network. off: Packets are transmitted without source routing. The print server will only respond to stations on the same ring. single r: All packets are sent with source routing. The Single Route method is used for broadcasts and when the route is unknown. all rt: All packets are sent with source routing. The All Routes method is used for broadcasts and when the route is unknown.
AppleTalk Settings	
Command	**Description**
appletalk	Enables or disables AppleTalk (EtherTalk) protocol operation on the print server. 0 disables, 1 (default) enables. For example, `at-config 0` will disable AppleTalk operation
name-override	(External print servers only) Specifies the name of the AppleTalk network. Up to 32 characters may be used.
Name	(Read-only parameter) The name of the printer on the AppleTalk network. A number after the name indicates that there are multiple devices with this name, and this is the Nth instance of the name.
Print Type	(Read-only parameter) Specifies the AppleTalk network printer type reported by the Jetdirect print server. Up to three print types may be reported.
Zone	(Read-only parameter) The name of the AppleTalk network zone on which the printer is located.
Phase	(Read-only parameter) AppleTalk phase 2 (P2) is preconfigured on the HP Jetdirect print server.
Status	(Read-only parameter) Indicates the current AppleTalk configuration status. READY: Indicates the HP Jetdirect print server is awaiting data. DISABLED: Indicates that AppleTalk was manually disabled. INITIALIZING: Indicates that the print server is registering the node address or name. An additional status message may also be displayed.

Table 3.4 Telnet Commands and Parameters (16 of 18)

DLC/LLC Settings	
Command	**Description**
dlc/llc-config	Enables or disables DLC/LLC protocol operation on the print server. 0 disables, 1 (default) enables. For example, `dlc/llc-config 0` will disable DLC/LLC operation.
strict-8022	Controls DLC/LLC protocol interpretation: 0 (default): disables, that is, provides loose interpretation. 1: enables, that is, provides strict interpretation).
Other Settings	
Command	**Description**
link-type	(10/100 Fast Ethernet) Sets the print server's link speed (10 or 100 Mbps) and communication mode (Full- or Half-Duplex). Selections are AUTO, 100FULL, 100HALF, 10FULL, 10HALF. For AUTO (default), the print server uses autonegotiation to determine the link speed and mode. If autonegotiation fails, then 100HALF is set.
laa	Specifies a locally administered address (LAA) that replaces the factory-assigned LAN Hardware (MAC) address. If LAA is used, a user-specified string of exactly 12 hexadecimal digits must be entered. For Token Ring print servers, the LAA address must start with hexadecimal 40 through 7F. For Ethernet print servers, the LAA address must start with hexadecimal X2, X6, XA, or XE, where X is any hexadecimal digit 0 through F. The default address is the factory-assigned address.
webscan-config	(Web Scan Config) Enables or disables the Web Scan feature on the print server when connected to a supported device. 0 disables, 1 (default) enables.
scan-idle-timeout	Specifies the number of seconds (1 - 3600) that an idle scan connection is allowed to remain open. 0 disables the timeout. The default is 300 seconds.
scan-email-config	(Email Scan Config) Enable or disable the scan-to-email feature in the Web Scan server. 0 disables, 1 (default) enables.
MFP-config	(MFP config) Enable or disable print server support of the client software provided with your multifunction or all-in-one peripheral. 0 (default): disables client software support (allows printing only). 1: enables client software support (allows printing and scanning).

Table 3.4 Telnet Commands and Parameters (17 of 18)

usb-mode	Specifies the communication mode over the USB port on the HP Jetdirect print server. ● Auto (default): Automatically negotiates and sets the highest communication mode possible for the attached printer or device. ● MLC: (Multiple Logical Channels) An HP-proprietary communication mode that allows multiple channels of simultaneous print, scan and status communications. ● BIDIR: A standard connection that supports bi-directional communications between the printer and print server. The print server sends print data and receives status from the printer. ● UNIDIR: A standard connection in which data is transferred in one direction only (to the printer).
usb-speed	(Read-only parameter, USB 2.0 products only) Specifies the autonegotiated communication speed over the USB connection between the HP Jetdirect print server and the device. ● Full Speed: 12 Mbits/sec as specified in the USB v2.0 specifications, compatible with USB v1.1 specifications. ● Hi-Speed: 480 Mbits/sec for USB v2.0 devices only. ● Disconnected: The USB port is not connected.
status-page-lang	Specifies the printer job language (PJL) that the print server will use to send the Jetdirect configuration/status page to the printer. ● Auto (default): The PDL is auto-detected when the print server is powered on or after a cold-reset. ● PCL: Hewlett-Packard Printer Control Language ● ASCII: Standard ascii characters ● HPGL2: Hewlett-Packard Graphics Language (v2) ● PS: Postscript language
Support Settings	
Command	**Description**
Web JetAdmin URL	(Read-only parameter) If HP Web Jetadmin discovers this device, the URL to access HP Web Jetadmin will be specified.
Web JetAdmin Name	(Read-only parameter) If HP Web Jetadmin discovers this device, the name of the HP Web Jetadmin host will be specified (if known).
support-name	Typically used to identify the name of a person to contact for support of this device.
support-number	Typically used to specify a phone or extension number to call for support of this device.

Table 3.4 Telnet Commands and Parameters (18 of 18)

support-url	A Web URL address for product information on this device over the Internet or an intranet.
tech-support-url	A Web URL address for technical support over the Internet or an intranet.

Menu Interface

An optional Menu interface is displayed when you type `menu` at the Telnet command prompt. The Menu interface eliminates the need to memorize commands, and provides structured menu lists for easy access to configuration parameters.

Figure 3.1 illustrates the Menu interface, using the TCP/IP menus as an example.

- From the **Main Menu** screen, select and enter a menu number. If there are submenus, select and enter a submenu number.
- If you want to change a parameter setting, enter "Y" (for "Yes") when prompted.

  Changes to parameters are made by editing the setting through the use of the **Backspace** key. If an unrecognized value is entered, the correct entry options will be displayed.

Note Changes are not saved on the Jetdirect print server until you exit a menu and, when prompted, choose to save your changes.

Figure 3.1 Example: Using the Menu Interface

```
    Main Menu
-------------------------------

1. General Menu
2. TCP/IP Menu...
3. SNMP Menu...
4. IPX/SPX Menu
5. AppleTalk Menu
6. DLC/LLC Menu
7. Other Settings
8. Support Settings
9. Wireless Settings
?. Help
e. Exit Menu
0. Exit Telnet
Enter Selection => 2
```

For the **TCP/IP Menu**, select **2**.

```
          TCP/IP Menu
-------------------------------

1. TCP/IP - Main Settings
2. TCP/IP - Print Options
3. TCP/IP - Raw Print Ports
4. TCP/IP - Access Control
5. TCP/IP - Other Settings
6. TCP/IP - Diagnostics
0. Return to Main Menu


Enter Selection => 1
```

For parameters listed in **TCP/IP Main Settings**, select **1**.

```
   TCP/IP - Main Settings
-------------------------------

  Host Name         : printer1
  IP Config Method  : USER SPECIFIED
  IP Address        : 192.168.45.39
  Subnet Mask       : 255.255.0.0
  Default Gateway   : 192.168.40.1
  Config Server     : 192.168.2.21
  TFTP Server       : 192.168.2.21
  TFTP File Name    : hpnp/print.cfg
  Domain Name       : Not Specified
  DNS Server        : Not Specified
  Pri WINS Server   : Not Specified
  Sec WINS Server   : Not Specified
  SMTP Mail Server  : Not Specified


Would you like to change any of the settings? (Y/[N]):Y
```

To edit these parameters, enter `Y`. Use the **Backspace** key to edit the parameters.

Changes are not saved until you save them when you exit the session.

Using Telnet to Erase the Existing IP Settings

To erase the IP address during a Telnet session, use the following command line entries:

1. Type `cold-reset`, then press **Enter**.
2. Type `quit`, then press **Enter** to exit Telnet.
3. Power the print server off/on.

Note This procedure resets all TCP/IP parameters, but only affects the TCP/IP subsystem. Parameters for other subsystems such as IPX/SPX or AppleTalk are not affected.

To reset all parameters to factory default values, refer to Chapter 8.

Using the Embedded Web Server

You can set IP parameters on HP Jetdirect print servers that support the embedded Web server. For more information, refer to Chapter 4.

Using the Printer Control Panel

When supported by the printer, HP Jetdirect internal print servers provide a configuration menu that can be accessed from the printer's control panel. Using this menu, you can enable or disable network protocols and set basic network parameters. For HP Jetdirect *wireless* print servers, you can also set basic wireless network connection parameters. For a summary of the available menu items, see Appendix C.

Note For instructions on using the control panel for your printer, refer to your printer documentation.

When accessing the HP Jetdirect menu from the printer's control panel, you can set the following TCP/IP network configuration parameters:

- IP host name
- DHCP lease behavior (release or renew)
- IP address of the print server
- Subnet mask
- Default gateway address
- Syslog server address
- Idle timeout period

If you need to configure more TCP/IP parameters than allowed by control panel configuration, use an alternate configuration tool (such as Telnet or the embedded Web server) as described in this chapter.

If the HP Jetdirect print server is configured to receive its TCP/IP configuration from the printer control panel, the configuration is saved on the print server when powered off/on.

Moving to Another Network

Note For HP Jetdirect *wireless* print servers, this section assumes that a wireless connection to your network has been established.

Moving an HP Jetdirect wireless print server to another network will require a new wireless connection to that network.

When moving an HP Jetdirect print server that is configured with an IP address to a new network, make sure that the IP address does not conflict with addresses on the new network. You may change the IP address of the print server to one that can be used on the new network, or erase the current IP address and configure another address after you are installed on the new network. See Chapter 8, "Troubleshooting the HP Jetdirect Print Server," for instructions to reset the print server to factory default settings.

If the current BOOTP server is not reachable, you may need to locate a different BOOTP server and configure the printer to this server.

If the print server was configured using BOOTP, DHCP or RARP, edit the appropriate system files with updated settings. If the IP address was manually set (for example, from the printer control panel or Telnet), reconfigure IP parameters as described in this chapter.

4

Using the Embedded Web Server

Introduction

HP Jetdirect print servers contain an embedded Web server that can be accessed from a compatible Web browser over an intranet. The embedded Web server provides access to configuration and management pages for the HP Jetdirect print server and the attached network device (such as a printer or multifunction, all-in-one device).

Tabs across the upper portion of your browser window provide access to device and networking pages. The tabs and functions displayed will vary depending on the capabilities of the device attached to the Jetdirect print server:

- If the attached device can serve up its own Web pages, then the available tabs and functions provided by the device are displayed, along with a Networking tab served by the Jetdirect print server.
- If Web pages for the attached device are not available, then the Jetdirect print server provides two tabs: Home and Networking.

Typical Home and Networking tabs served by the HP Jetdirect print server are illustrated in Figure 4.1 and Figure 4.2, respectively. For more information, see the "HP Jetdirect Home Tab" and the "Networking Tab".

As described in this section, the available Home and Networking features will depend on the version of Jetdirect firmware, currently x.25.00 or later.

[HP Jetdirect Home Tab]

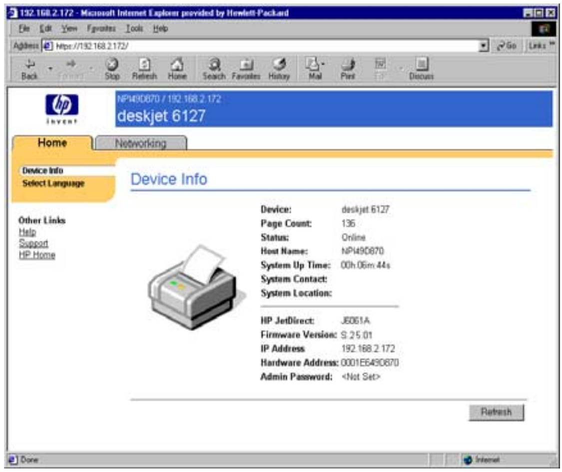


Figure 4.1 Typical HP Jetdirect Home Tab

[Networking Tab]

Menu items in left margin

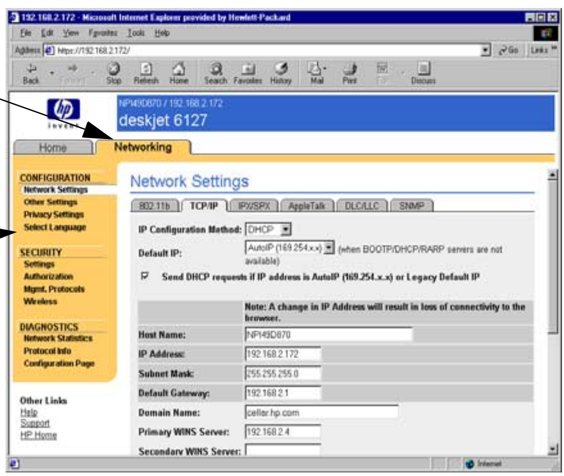


Figure 4.2 HP Jetdirect Networking Tab

For network parameter descriptions, see "Networking Tab".

Requirements

Compatible Web Browsers

To access the embedded Web server, you must use a compatible Web browser. In general, the embedded Web server can be used with Web browsers that support HTML 4.01 and cascading style sheets.

Hewlett-Packard tests a number of current and older browsers using a variety of systems. In general, we recommend using the following browsers:

- Microsoft Internet Explorer 5.0 or greater
- Netscape Navigator 6.0 or greater

Browser Exceptions

Due to known problems experienced during testing, we recommend that you do not use the following browsers:

- Netscape Navigator 6.2.x with SSL

Supported HP Web Jetadmin Version

HP Web Jetadmin is a browser-based, enterprise management tool for network devices. It is available from HP online support at the following URL:

http://www.hp.com/go/webjetadmin

To make use of improved security features, HP Web Jetadmin version 7.0 or greater is recommended for operation with the HP Jetdirect embedded Web server. Using HP Web Jetadmin 7.0, you can enable the SNMP v3 agent and seamlessly create an SNMP v3 account on the print server.

A link to HP Web Jetadmin will be displayed on the embedded Web server if HP Web Jetadmin has discovered this device through an Integration URL.

Currently, browser support between HP Web Jetadmin and the embedded Web server may differ. For supported browsers with HP Web Jetadmin, visit http://www.hp.com/go/webjetadmin.

Viewing the Embedded Web Server

Note For HP Jetdirect *wireless* print servers, this section assumes that a wireless connection to your network has been established.

If a wireless network connection has not yet been established, you can use the embedded Web server to configure the HP Jetdirect wireless print server with settings for your network. See Appendix B.

Before you can use the embedded Web server, the HP Jetdirect print server must be configured with an IP address. For a description of an IP address and an overview of TCP/IP networking, see Appendix A.

There are many ways to configure an IP address on the print server. For example, you can automatically configure IP parameters over the network using BOOTP (Bootstrap Protocol) or DHCP (Dynamic Host Configuration Protocol) each time the print server is turned on. Or, you can manually configure IP parameters using the printer's control panel (for selected printers with internal print servers), Telnet, the "arp" and "ping" commands, HP Web Jetadmin or other management software. For more information on TCP/IP configuration options, see Chapter 3.

When powered on, an HP Jetdirect print server that is unable to retrieve a valid IP address from the network will automatically assign itself either a legacy default IP address 192.0.0.192 or a link-local address in the range 169.254.1.0 to 169.254.254.255. The IP address configured on your print server can be determined by inspecting the Jetdirect configuration page for the print server. See Chapter 3 for more information.

If the legacy default IP address 192.0.0.192 has been assigned, you must temporarily set up your computer with the same IP network number or establish a route to the print server before you can gain access to the embedded Web server.

After an IP address is established on the print server, perform the following steps:

1. Run a supported Web browser.
2. Enter the IP address of the print server as the URL.

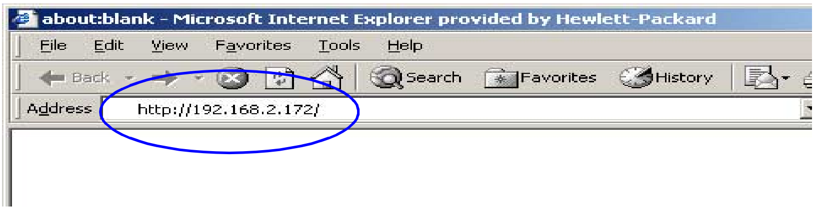


Figure 4.3 Entering the IP Address

3. If prompted with security alerts, click **Yes** to proceed.

   For full-featured wired print servers, the embedded Web server uses standard HTTP for initial access. However, they may be configured to appear as a secure site using an installed X.509-compliant certificate for identification. When properly configured, encrypted browser communications through HTTPS (secure HTTP) may be used for secure access.

   For full-featured wireless print servers, the embedded Web server will appear as a secure site for initial access. By default, encrypted browser communications through HTTPS is initially required. A factory-installed, self-signed certificate (X.509 compliant) is used for device identification.

   Although not recommended, you can use your **Internet Options** menu to configure your browser to ignore security warnings if the print server is configured to operate through HTTPS. See Mgmt. Protocols.

   Value-based, non-upgradeable HP Jetdirect print servers (for example HP Jetdirect 175x and 200m) do not support a secure embedded Web server.

4. An embedded Web server page will be displayed, either the Home page of the HP Jetdirect print server or a device page served by a Web server on the device.

Operating Notes

- If you enter or change a configuration parameter value, click **Apply** to enable your change, or click **Cancel** to erase your change.
- Changes to the IP address will close the connection to the embedded Web server. To re-establish a connection, use the new IP address.

CAUTION Changes to the IP address on the HP Jetdirect print server may result in printing failures for clients that have been configured to print to this printer using the previous IP address.

- The embedded Web server provides access to wireless network connection parameters on HP Jetdirect wireless print servers.

CAUTION If you change the wireless network settings, you may lose your connection. To reconnect, you may need to adjust your system to the new settings.

If the print server loses its network connection, you may need to reset it to a factory-default state and reinstall it.

- Features and configuration parameters not supported by value-based print servers, such as HP 175x and 200m, will not appear.
- Novell NetWare networks: On the **Network Settings** page, use the **IPX/SPX** tab to configure Novell Directory Services (NDS) Queue Server mode parameters. Note that the embedded Web server cannot create NDS objects (print server, printer, and print queue objects) on the Novell server. To create these objects, use a Novell NetWare utility, such as NWAdmin, or configure the IPX/SPX stack for NDS through HP utilities, such as the HP Install Network Printer Wizard or HP Web Jetadmin.

HP Jetdirect Home Tab

The **Home** tab will display the HP Jetdirect home page if a Web server in the attached device cannot be accessed or does not exist. The HP Jetdirect home page displays a generic printer graphic to represent the attached device. The HP Jetdirect print server's product model, firmware version, and network addresses are displayed along with any device information that can be retrieved. Table 4.1 provides a summary of the items displayed on the HP Jetdirect home page.

Table 4.1 HP Jetdirect Home Page Items (1 of 2)

Item	Description
Home tab	Displays the Jetdirect Home page. This tab will not appear if Web pages served by the attached device can be accessed.
<Device Tabs>	Various device tabs may appear if the attached network device (such as the printer or multifunction all-in-one device) contains a supported embedded Web server. Device tabs provide access to the Web pages served by the device.
Networking tab	Provides access to network configuration, security, and diagnostic parameters. For more information, see Networking Tab.
Device Info	Identifies the device (such as the model name of the printer or multifunction all-in-one device) connected to the network through the HP Jetdirect print server. Other information that can be retrieved from the device are also displayed (such as Page Count, or Control Panel status). The information will vary depending on the features of the attached device.
Select Language	Appears if the HP Jetdirect Web pages support multiple languages. Supported languages may also be selected through language preference settings in your browser. To display supported non-English languages, the use of cookies must be enabled in your browser settings.
Scan	Runs the Web Scan server on the HP Jetdirect print server if it supports the attached network device and is enabled. Web Scan allows you to perform a simple scan from the device using your Web browser. A scan-to-email configuration option is provided.

Table 4.1 HP Jetdirect Home Page Items (2 of 2)

Item	Description
Host Name	Specifies the IP host name assigned to the device and stored on the HP Jetdirect print server. See TCP/IP on the Networking Tab.
System Up Time	The length of time since either the HP Jetdirect print server or the network device was last powered off/on.
System Contact	A text string (stored on the HP Jetdirect print server) for the name of a person to contact for this device. See TCP/IP on the Networking Tab.
System Location	A text string (stored on the HP Jetdirect print server) that identifies the physical location of this device. See the Networking TCP/IP configuration pages.
HP Jetdirect	The product number of the HP Jetdirect print server (for example HP J4169A).
Firmware Version	The version of the operating instructions installed on the HP Jetdirect print server.
IP Address	The Internet Protocol address configured on the HP Jetdirect print server. For general information on IP addresses, see Appendix A.
Hardware Address	The LAN hardware (or MAC, Media Access Control) address of the HP Jetdirect print server. This unique address is assigned by Hewlett-Packard, but can be locally administered.
LAA	A Locally Administered Address (LAA) that replaces the LAN Hardware (MAC) address. The LAA may be configured under local control by a network administrator. By default, the LAA is the factory-assigned LAN Hardware address.
Admin Password	Specifies whether or not an administrator password has been set. This password may also be configured through a Telnet session with the HP Jetdirect print server, or from HP Web Jetadmin. (EIO print servers only) Because passwords are synchronized with selected printers, the password may have also been set through printer security Web pages. Use the **Admin Password** page to set or clear administrator passwords. If an administrator password has been set, you will be prompted for a User Name and Password to access network parameters. For more information, click Help, or see the Admin. Account section in this guide.

Networking Tab

The **Networking** tab provides access to HP Jetdirect network configuration parameters and status. The menu items in the left margin provide access to configuration and status pages.

Table 4.2 Networking Menu Items

CONFIGURATION section	
• Network Settings	• Privacy Settings
• Other Settings	• Select Language
SECURITY section	
• Settings	• Mgmt. Protocols
• Authorization	• Wireless
DIAGNOSTICS section	
• Network Statistics	• Configuration Page
• Protocol Info	

Sending Product Information to HP

The first time that you access the **Networking** tab in the embedded Web server, you will be prompted to allow the sending of product information to HP using the Internet. Product identification and usage data collected by HP will be used to improve product features and services. Personal data is not collected in accordance with HP privacy policies. See Hewlett-Packard Online Privacy Statement.

You can choose to enable or disable this feature at any time using the **Privacy Settings** page under the **Networking** tab.

Network Settings

The **Network Settings** pages allow you to set or change configuration parameters for 802.11b (Wireless Ethernet), TCP/IP, IPX/SPX, AppleTalk, DLC/LLC, and SNMP protocols. To assign a parameter setting, enter the desired value and click **Apply**.

802.11b (Wireless Ethernet)

The 802.11b pages allow you to create or change your wireless network configuration parameters for your IEEE 802.11b wireless ethernet connection. In addition, you may also configure basic TCP/IP settings at the same time.

The configuration parameters are summarized in Table 4.3. For more information on setting up your HP Jetdirect wireless print server, see Appendix B.

The **802.11b** tab displays a single, static page that contains all wireless configuration parameters required to make a wireless connection to your network. Click **Apply** to set or **Cancel** to ignore your configuration entries. To reset to factory-default values, click **Reset to defaults**.

Alternatively, you may choose to click the **Use Wizard** button at the top of the **802.11b** page to configure your wireless network connection. This button will launch a configuration wizard that will guide you through the required 802.11b wireless configuration parameters and, depending on your choices, will bypass unnecessary parameters.

Note If you improperly exit the wizard (for example, by failing to use the Cancel button), an *Operation Failed* screen may appear. If so, wait approximately two minutes before entering the wizard again.

Note An HP Jetdirect wireless print server with factory-default settings (Ad Hoc mode) may be easily accessed by unauthorized clients. Therefore, it should not be powered on with factory-default settings longer than necessary, and any configuration changes that you make should be verified.

Table 4.3 802.11B Configuration Parameters (1 of 7)

Item	Description
Ad Hoc (peer-to-peer)	"Ad Hoc" (or peer-to-peer) is a wireless communication topology in which the wireless devices on a network communicate directly with each other. Access Points are not used. Other terms used for Ad Hoc mode include Independent Basic Service Set (IBSS), and "computer-to-computer" mode. The factory-default mode configured on the HP Jetdirect print server is Ad Hoc. To initially communicate with the print server, your wireless computer must be set up for Ad Hoc mode.
Channel	(Ad Hoc mode only) The channel selection identifies the radio frequency that the print server will use to broadcast its availability if it fails to associate with the specified Ad Hoc network on any channel. By factory default, channel 10 (2457 MHz) will be used. However, channel 11 (2462 MHz) is also available.
Infrastructure	"Infrastructure" is a wireless communication topology in which communications to and from each wireless network device go through an Access Point. An Access Point is a device, like a gateway or hub, that receives and forwards wireless communications to other network devices. Typically, an Access Point connects wireless devices to a cabled network. Infrastructure mode is the preferred topology for large networks. Other terms used for Infrastructure mode include Basic Service Set (BSS), "star topology", and "enterprise mode".

Table 4.3 802.11B Configuration Parameters (2 of 7)

Item	Description
Network Name	Specifies the name of the wireless network to which the HP Jetdirect print server will connect. The Network Name is also called the SSID (Service Set Identifier) and identifies the ESS (Extended Service Set) that is normally associated with larger Infrastructure Mode networks. An empty (or “blank”) SSID field is accepted, for example, on networks that rely on signal strength, encryption and authentication methods to control network access. The factory-default SSID configured on the HP Jetdirect print server is “hpsetup”. To initially communicate with the print server, your wireless computer’s SSID must also be “hpsetup”. (Note: the SSID characters are case-sensitive. Be sure to use the appropriate lower- or uppercase characters.)
Open System	(No authentication) Select this authentication method if your wireless network does not require device authentication or security to access the network. However, your network may still use encryption keys for data privacy.
Shared Key	(Requires a WEP key) Select this authentication method if each device on your wireless network uses a shared encryption key (that is, a shared "password" value) for network access and communications. Each device on the network must use the same key. The HP Jetdirect print server supports IEEE 802.11 Wired Equivalent Privacy (WEP) keys for encrypted network communications. If you select Shared Key authentication, you must configure WEP keys.
EAP/802.1x	(Infrastructure mode only) Select 802.1x Extensible Authentication Protocol (EAP) for advanced authentication. EAP/802.1x is used with an authentication server, such as a RADIUS (Remote Authentication Dial In User Service, RFC 2138) server, for wireless network access. If EAP/802.1x authentication is selected, you will need to configure additional parameters. Some parameters will depend on the EAP/802.1x protocols that you enable for use on your network.

Table 4.3 802.11B Configuration Parameters (3 of 7)

Item	Description
Enable Protocols	Enable (check) or disable (clear) the EAP protocols supported by the print server. **LEAP**: (Lightweight Extensible Authentication Protocol). LEAP is a Cisco Systems, Inc. proprietary protocol. LEAP requires an EAP User Name and EAP Password. Dynamic encryption keys are also used. **PEAP**: (Protected Extensible Authentication Protocol). PEAP uses digital certificates for network server authentication and passwords for client authentication. PEAP requires an EAP User Name, EAP Password, and CA Certificate. Dynamic encryption keys are also used. **MD5**: (EAP using Message Digest Algorithm 5, RFC 1321). EAP-MD5 uses a password protected by the MD5 encryption algorithm. For MD5, enter an EAP User Name and EAP Password. Static encryption keys are also used. . **TLS**: (EAP using Transport Layer Security, RFC 2716). EAP-TLS uses X.509-compliant digital certificates for both client and network server authentication. TLS requires an EAP User Name, Jetdirect Certificate, and CA Certificate. Dynamic encryption keys are also used. **TTLS**: (EAP using Tunneled Transport Layer Security). EAP-TTLS is an EAP-TLS extension that also uses X.509-compliant digital certificates. TTLS requires an EAP User Name, EAP Password and CA Certificate. Dynamic encryption keys are also used. **<Custom>**: While specific configuration is not required, a unique combination of User Name, Password and digital certificates for EAP authentication may be specified.
User Name	Specify an EAP/802.1x user name (up to 128 characters maximum) for this device. The default user name is the default host name of the print server, NPIxxxxxx, where xxxxxx are the last six digits of the LAN hardware (MAC) address.
Password, Confirm Password	Specify an EAP/802.1x password (up to 128 characters maximum) for this device. Enter the password again in the Confirm Password field to ensure it was properly entered.

Table 4.3 802.11B Configuration Parameters (4 of 7)

Item	Description
Server ID	(EAP-TLS, EAP-TTLS only) Specify the Server ID validation string that identifies and validates the authentication server. The Server ID string is specified on the digital certificate issued by a trusted Certificate Authority (CA) for the authentication server. The entry may be a partial string unless the **Require Exact Match** is enabled.
Require Exact Match	(EAP-TLS, EAP-TTLS only) Enable (check) or disable (clear) whether the Server ID string entry must match exactly the string received from the authentication server during 802.1x EAP authentication.
Encryption Strength	Specify an encryption strength to be used during communications with the authentication server. You may select **Low**, **Medium**, or **High** encryption strength. For each encryption strength, ciphers are specified to identify the weakest cipher allowed. Early browsers may only support 40-bit (Low) encryption levels.
Jetdirect Certificate	(EAP-TLS only) An X.509-compliant digital certificate that validates the Jetdirect print server identity must be installed. In general, a Jetdirect certificate may be self-signed or provided by an independent trusted source, such as a Certificate Authority. By factory default, a self-signed Jetdirect certificate is preinstalled. While self-signed certificates are sometimes permitted, they do not provide true client validation. Therefore, for EAP authentication methods that require a Jetdirect certificate, it must be provided by a trusted third party or Certificate Authority. To update an existing certificate, or to install a new certificate, click **Configure**. Installing a new certificate will overwrite the existing certificate. If you request a certificate from an independent Certificate Authority, you will not be able to complete the EAP/802.1x configuration until your digital certificate has been received and installed.
CA Certificate	(PEAP, EAP-TLS, EAP-TTLS only) To validate the authentication server's identity, a CA (or "Root") certificate must be installed on the print server. This CA certificate must be issued by the Certificate Authority who signed the authentication server's certificate. To configure or install a CA certificate, click **Configure**.

Table 4.3 802.11B Configuration Parameters (5 of 7)

Item	Description
Authentication Behavior: Reauthenticate on Apply	Enable (check) or disable (clear) this checkbox to control authentication when you click **Apply** on this page, assuming valid configuration entries have been made. **Note:** This parameter does not apply to security or wireless configuration wizards. Changes to wireless parameters through a wizard will always cause the print server to reauthenticate. If disabled (default), the print server will not attempt reauthentication unless configuration changes cause the print server to disconnect and reconnect to the network. If enabled, the print server will always try to reauthenticate using the configuration values set.
EAP/PSK	Select Extensible Authentication Protocol Pre-Shared Key (EAP/PSK) for advanced authentication. EAP/PSK is typically for small networks where authentication servers are not used. If EAP/PSK authentication is selected, you will need to enter a network pass-phrase that is used to generate the pre-shared key for your network.
Pass-phrase	Enter a network pass-phrase that will be used to generate the pre-shared key for EAP/PSK authentication on your network. A pass-phrase must be from 8 to 63 ASCII characters in the hexadecimal range 21 through 7E (characters 0-9, a-z, A-Z and numerous special characters including !, @, #, $, %, ^, &, (,), _, +, =, -, {, }, [,], \, /, “, <, >, ?, “, ‘, ~).
Disabled (No encryption)	Select **Disabled (No encryption)** if your wireless network does not use encryption keys for network access or communications.
Enabled	Select **Enabled** to use your encryption settings specified below for network access and communications.

Table 4.3 802.11B Configuration Parameters (6 of 7)

Item	Description
Static (WEP)	Select **Static (WEP)** if your wireless network uses WEP (Wired Equivalent Privacy) keys for basic access control and data privacy. Under the control of your network administrator, each wireless device on the network must be configured with the same key. **Encrypt transmit data using:** Select the current active key. The HP Jetdirect print server can store up to four WEP keys using four key positions (Key 1, 2, 3, 4). But there can be only a single active key for a given network (or SSID) at a time. Key 1 is the default active key. **Note:** When you enter WEP keys, be sure to enter them in the key positions (or fields) that match other wireless devices on your network. For example, if other devices on your wireless network are using a WEP key in the Key 2 position as the active key, then you must also enter this WEP key in the Key 2 field on the Jetdirect print server and select Key 2 as the active key. The different key positions will have different encryption and decryption results. The HP Jetdirect wireless print server supports WEP keys for 40/64-bit and 104/128-bit encryption. To enter one or more WEP keys: **Input keys in:** Select whether you'll use alphanumeric characters or hexadecimal digits to specify WEP keys. Select **Alphanumeric** to enter your WEP keys using alphanumeric ASCII (8-bit) characters. Alphanumeric characters are limited to 0 through 9, a through z, A through Z. (Note: Alphanumeric characters are case-sensitive.Entering lower- or uppercase characters, 'a - z' or 'A - Z', will result in different WEP key values.) Select **Hexadecimal** to enter hexadecimal (4-bit) digits. Hexadecimal digits may be 0 through 9, a through f, A through F. (Note: Hexadecimal digits are not case-sensitive.Entering lower- or uppercase values, 'a - f' or 'A - F', will result in the same WEP key value.) All keys entered must be of the same length, either for 40/64-bit or 104/128-bit encryption. In each Key field, enter your 5 alphanumeric characters or 10 hexadecimal digits (40 bits) for "64-bit" encryption, or 13 alphanumeric characters or 26 hexadecimal digits (104 bits) for "128-bit" encryption. (Note: In both cases, 24 "Initialization Vector" bits are automatically added.)

Table 4.3 802.11B Configuration Parameters (7 of 7)

Item	Description
Dynamic	For dynamic encryption, you may select one of the following options: ● Basic Encryption: Dynamic WEP encryption is supported. ● Robust Encryption: Dynamic Wi-Fi Protected Access (WPA) and WEP encryption protocols are supported. When configured for EAP/PSK authentication, the print server uses Robust Encryption (WPA encryption protocols). When configured for EAP/802.1x authentication (LEAP only), the print server should be configured with Basic Encryption. When configured for EAP/802.1x authentication (PEAP, TLS, TTLS only), the print server may be configured with either Basic Encryption or Robust Encryption depending on your network. Dynamic encryption protocols are under the control of the authentication server and also must be supported by the Access Point.
TCP/IP settings	To minimize reconnections to the print server for initial network configuration, the 802.11b page allows you to configure the following basic TCP/IP settings at the same time that you configure your wireless connection settings: ● IP Configuration Method ● IP address ● Subnet Mask ● Default Gateway For a description of these parameters, see TCP/IP below.

TCP/IP

The **TCP/IP** page provides configuration parameters summarized in Table 4.4.

Table 4.4 TCP/IP Settings (1 of 3)

Item	Description
IP Configuration Method	Selects the method that the HP Jetdirect print server will use for its IP configuration parameters: BOOTP (default), DHCP, Manual, or Auto IP. For BOOTP or DHCP, the IP parameters will be automatically configured by a BOOTP or DHCP server each time the print server is powered on. If you select Manual, then basic IP parameters can be manually entered using this Web page, or using other available tools. If you select Auto IP, then a unique link-local address 169.254.x.x will be assigned. For more information, see Chapter 3.
Host Name	Specifies a readable IP name (the SNMP SysName object) for the network device. The name must start with a letter and can end in a letter or number, up to 32 ASCII characters.
IP Address	Use this field to manually assign the Internet Protocol address on the HP Jetdirect print server. The IP address is a four byte (32-bit) address in the form "n.n.n.n", where 'n' is a number from 0 to 255. An IP address uniquely identifies a node on a TCP/IP network. Duplicate IP addresses on a TCP/IP network are not allowed. For more information on IP addresses, see Appendix A.
Subnet Mask	If subnetting is used, use this field to manually assign a subnet mask. A subnet mask is a 32-bit number that, when applied to an IP address, determines which bits specify the network and subnet, and which bits uniquely specify the node. For more information on subnet masks, see Appendix A.
Default Gateway	Identifies the IP address of a router or computer that is used to connect to other networks or subnetworks.
Domain Name	Specifies the name of the Domain Name System (DNS) domain that the HP Jetdirect print server resides in (for example, support.hp.com). It does not include the host name; it is not the Fully Qualified Domain Name (such as printer1.support.hp.com).

Table 4.4 TCP/IP Settings (2 of 3)

Item	Description
Primary WINS Server	Specifies the IP address of the primary Windows Internet Naming Service (WINS) server. The WINS server provides IP address and name resolution services for network computers and devices.
Secondary WINS Server	Specifies the IP Address to be used for WINS if the primary WINS Server is unavailable.
Syslog Server	Specifies the IP address of a host computer that is configured to receive syslog messages from the HP Jetdirect print server. If a Syslog Server is not specified, syslog messages are disabled. For more information, see Appendix A.
Syslog Maximum Messages	Specifies the maximum number of syslog messages that can be sent by the HP Jetdirect print server on a per-minute basis. This setting allows administrators to control the log file size. The default is 10 per minute. If set to zero, no maximum number is defined.
Syslog Priority	Controls the filtering of syslog messages that are sent to the syslog server. The filter range is 0 to 8, with 0 being the most specific and 8 being the most general. Only messages that are lower than the filter level specified (that is, higher in priority) are reported. The default value is 8 which reports all syslog messages. A value of zero effectively disables syslog reporting.
Idle Timeout	Specifies the number of seconds that an idle connection is allowed to remain open. Up to 3600 seconds can be set. 270 is the default value. If set to 0, the timeout is disabled and TCP/IP connections will remain open until closed by the device at the other end of the network (for example, a workstation).
TTL/SLP	Specifies the IP multicast Time To Live (TTL) discovery setting for Service Location Protocol (SLP) packets. The default value is 4 hops (the number of routers from the local network). The range is 1-15. If set to -1, multicast capability is disabled. For print servers configured for Auto IP (link-local) addresses, this field will be ignored. TTL on outbound packets will always be set to 255 and limited to the link-local network.

Table 4.4 TCP/IP Settings (3 of 3)

Item	Description
System Contact	Identifies a person who is assigned to administer or service this device. This field may include a phone number or similar information. When configured, this parameter will be displayed on the HP Jetdirect home page.
System Location	Specifies the physical location of the device or related information. Only printable ASCII characters are allowed, up to 64 characters. When configured, this parameter will be displayed on the HP Jetdirect home page.
Banner Page	Specifies whether to enable or disable printing of an LPD banner page for print jobs. For HP Jetdirect external print servers that provide multiple ports, you can configure each port. For internal print servers, only a single port is available (Port 1).
Default IP	Specifies the IP address to use when the print server is unable to obtain an IP address from the network during a forced TCP/IP reconfiguration (for example, when manually configured to use BOOTP/DHCP). DEFAULT_IP: sets the legacy default IP address 192.0.0.192. AUTO_IP: sets a link-local IP address 169.254.x.x. The initial setting is determined by the IP address obtained when first powered on.
Send DHCP requests	A checkbox is used to specify whether DHCP requests will be periodically transmitted when a legacy default IP address 192.0.0.192 or link-local IP address 169.254.x.x has been automatically assigned. Clear the checkbox to disable DHCP requests. Check the checkbox (default) to enable DHCP requests.

IPX/SPX

The **IPX/SPX** tab allows you to configure IPX/SPX (Internet Packet Exchange/Sequenced Packet Exchange) parameters on the HP Jetdirect print server for operation on a Novell NetWare or IPX/SPX-compatible network (such as a Microsoft network). See Table 4.5 for a description of items on this page.

CAUTION If you are using direct-mode printing over IPX/SPX on a Microsoft network, **do not** disable IPX/SPX.

For a Novell NetWare network:

- The embedded Web server may be used to select Queue Server Mode parameters in a Novell Directory Services (NDS) environment.
- You cannot create the NDS print server, printer, and queue objects using the embedded Web server. To create these objects, use other available tools or utilities.

Table 4.5 IPX/SPX Settings (1 of 2)

Item	Description
IPX/SPX Enable	Enables or disables the IPX/SPX protocols on the HP Jetdirect print server. If the checkbox is empty, IPX/SPX is disabled.
IPX/SPX Frame Type	Specify the IPX/SPX frame type to be used by the HP Jetdirect print server on your network. After a frame type has been configured, all others will be counted and discarded. ● AUTO (default) senses all frame types and configures the first one detected. ● EN_8023 limits the frame type to IPX over IEEE 802.3 frames. ● EN_II limits the frame type to IPX over Ethernet frames. ● EN_8022 limits the frame type to IPX over IEEE 802.2 with IEEE 802.3 frames. ● EN_SNAP limits the frame type to IPX over SNAP with IEEE 802.3 frames. ● TR_8022 limits the frame type to IPX over IEEE 802.2 LLC with IEEE 802.5 frames. ● TR_SNAP limits the frame type to IPX over SNAP with IEEE 802.5 frames.
SAP Interval	Specifies the time interval (in seconds) that the HP Jetdirect print server waits to send Service Advertising Protocol (SAP) messages, which are broadcast to advertise its service capabilities on a Novell NetWare network. To disable SAP messages, use the value “0”.

Table 4.5 IPX/SPX Settings (2 of 2)

Item	Description
Print Server Name	Specify a NetWare printer name for the HP Jetdirect print server (alphanumeric characters only). The default name is NPIxxxxxx, where xxxxxx are the last six digits of the HP Jetdirect print server's LAN hardware (MAC) address.
NDS Tree Name	Specify the name of the NDS tree for this device. The NDS (Novell Directory Services) tree name refers to the name of the organizational tree used by your network. To disable NDS support, leave this field blank.
NDS Context	The print server's NDS context refers to the NDS container or organizational unit that contains the print server object. Print queue and device objects can be located anywhere within the NDS tree, but the HP Jetdirect print server must be configured with the fully-qualified print server object name. For example, if the print server object is found in the container "marketing.mytown.lj", the fully qualified print server context name (CN) is: "OU=marketing.OU=mytown.O=lj" (where OU is an Organization Unit container and O is an Organization container within the NDS tree). The print server will also accept “marketing.mytown.lj”. To disable NDS support, leave this field blank. Note: NDS objects cannot be created by the embedded Web server.
Job Poll Interval	Specifies the time interval (seconds) that the HP Jetdirect print server will wait to check for print jobs in a print queue.
PJL Configuration	For Printer Job Language (PJL) parameters, enable (check) or disable (clear) the parameters provided: ● Banner Pages (for printing separator pages between print jobs) ● End-Of-Job Notification (if received from the printer, an end-of-job message will be forwarded to a client application) ● Toner Low Notification (if received from the printer, the HP Jetdirect print server will forward a “toner low” message to a client application)

AppleTalk

The **AppleTalk** tab allows you to configure selected AppleTalk settings on the HP Jetdirect print server. See Table 4.6 for a description of items on this page.

Note The AppleTalk parameters displayed include the AppleTalk printer types that are advertised on the network.

The HP Jetdirect print server supports AppleTalk Phase 2 only.

Table 4.6 AppleTalk Settings

Item	Description
AppleTalk Enable checkbox	Enable (check) or disable (clear) the AppleTalk protocol on the print server. If AppleTalk is enabled, AppleTalk parameters stored on the print server are displayed.
Device (AppleTalk) Name	Specify the name of the printer on the AppleTalk network. If you enter a name that is already assigned on your network, the AppleTalk name specified on the Jetdirect configuration page will be followed by a number to indicate that it is a duplicate.
Print Type	Identify the type of printer being advertised on the network. Up to two types can be displayed (for example, HP LaserJet and LaserWriter).
Zone	Select an available AppleTalk network zone for the printer. By default, the zone currently selected will be displayed. Click the **Refresh selected zone Info** button to refresh the list of available zones.

DLC/LLC

Using the checkbox provided, you can enable (check) or disable (clear) the DLC/LLC (Data Link Control/Logical Link Control) protocols on the HP Jetdirect print server. If the checkbox is clear, DLC/LLC protocols are disabled.

SNMP

You can specify or change the SNMP (Simple Network Management Protocol) parameters provided. See Table 4.7.

CAUTION If you use HP Web Jetadmin to manage your devices, you should use HP Web Jetadmin to seamlessly configure SNMP v3 and other security settings on the print server.

Using the embedded Web server to create the SNMP v3 account will erase any existing SNMP v3 accounts. In addition, the SNMP v3 account information will need to be implemented on the SNMP management application. For more information, see SNMP v3.

Table 4.7 SNMP Settings (1 of 2)

Item	Description
Enable SNMPv1/v2 read-write access	This option enables the SNMP v1/v2c agents on the print server. Custom community names can be configured to control management access to the print server. An SNMP Set Community Name is a password to be able to configure (or “write”) SNMP information on the HP Jetdirect print server. An SNMP Get Community Name is a password to retrieve (or “read”) SNMP information on the HP Jetdirect print server. An incoming SNMP SetRequest or GetRequest command must contain the appropriate Set or Get community name before the print server will respond. A community name must be ASCII characters and can be up to 255 characters long. The default Get community name is “public”, which can be disabled to restrict access. If “public” is disabled, some port monitors or discovery utilities may not operate properly.
Enable SNMPv1/v2 read-only access	This option enables the SNMP v1/v2c agents on the print server, but limits access to read-only. Write-access is disabled. The default Get community name “public” is automatically enabled.

Table 4.7 SNMP Settings (2 of 2)

Item	Description
Disable SNMPv1/v2	This option disables the SNMP v1/v2c agents on the print server, which is recommended for secure environments. If SNMP v1/v2c is disabled, some port monitors or discovery utilities may not operate properly.
Enable SNMPv3	(Full-featured HP Jetdirect print servers only) This option enables (check) or disables (clear) the SNMP v3 agent on the print server. When enabled, an SNMP v3 account must be created on the print server, and the account information must be implemented on the SNMP v3 management application. You may create an account by providing the following information: User Name: the SNMP v3 account user name. Authentication Key: a 16-byte hexadecimal value for authenticating the SNMP packet contents using the MD5 algorithm. Privacy Key: a 16-byte hexadecimal value for encrypting the data portion of the SNMP packet using the DES algorithm. Context Name: the view context in which this user can access SNMP objects. It is always “Jetdirect”.

Other Settings

This item provides access to a variety of management and printing configuration options. The following tabs are provided:

- Misc. Settings: for enabling miscellaneous advanced protocols and functions
- Firmware Upgrade: (for print servers that support firmware upgrades) to update your HP Jetdirect print server with new features and enhancements
- LPD Queues: for setting up print queues used in printing under LPD (line printer daemon) printing services
- USB Settings: (external print servers only) to configure Universal Serial Bus connection parameters
- Support Info: to set up the **Support** link located under **Other Links** in the left margin
- Refresh Rate: to set the time interval (in seconds) for embedded Web diagnostic page updates

Misc. Settings

The Miscellaneous Settings parameters allow you to set a variety of advanced protocols and features, as described below. See Table 4.8.

Table 4.8 Miscellaneous Settings (1 of 5)

Item	Description
SLP Config	Enable or disable SLP (Service Location Protocol), used by selected client application software to automatically discover and identify the HP Jetdirect print server.
Telnet Config	Enable or disable access to HP Jetdirect configuration parameters using Telnet. For more information, see Chapter 3.
mDNS	Enable or disable Multicast Domain Name System (mDNS) services. mDNS is typically used on small networks for IP address and name resolution (through UDP port 5353) where a conventional DNS server is not used.
Multicast IPv4	Enable or disable the receipt and transmission of IP version 4 multicast packets by the print server.
9100 Config	Enable or disable port 9100 services. Port 9100 is an HP-proprietary raw TCP/IP port on the HP Jetdirect print server and is the default port for printing. It is accessed by HP software (for example, the HP Standard Port).
FTP Printing	Enable or disable File Transfer Protocol services available on the HP Jetdirect print server for printing. For more information, see Chapter 6.
LPD Printing	Enable or disable the Line Printer Daemon services on the HP Jetdirect print server. LPD on the HP Jetdirect print server provides line printer spooling services for TCP/IP systems. For more information, see Chapter 5.
IPP Printing	Enable or disable the Internet Printing Protocol on the HP Jetdirect print server. If the printer is properly connected and accessible, IPP allows printing to this device over the Internet (or intranet). A properly configured IPP client system is also required. For information on IPP client software, see Chapter 2.

Table 4.8 Miscellaneous Settings (2 of 5)

Item	Description
Link settings	(For wired 10/100TX networks only) Set the network link speed(10 or 100 Mbps) and communication mode (full- or half-duplex) for HP Jetdirect 10/100TX print servers. The available settings are listed below. **CAUTION**: If you change the link setting, network communications with the print server and network device may be lost. ● AUTO: (Default) The print server uses autonegotiation to match the network's link speed and communication mode. If autonegotiation fails, 100TXHALF is set. ● 10TXFULL: 10 Mbps, full-duplex operation ● 10TXHALF: 10 Mbps, half-duplex operation ● 100TXFULL: 100 Mbps, full-duplex operation ● 100TXHALF: 100 Mbps, half-duplex operation
DNS Server	Specify the IP address of the DNS (Domain Name System) server.
Email (SMTP) Server	Specify the IP address of the preferred outgoing e-mail Simple Mail Transport Protocol (SMTP) server, for use with supported Scan devices.
Scan Idle Timeout	Specifies the number of seconds that an idle connection for scanning is allowed to remain open. The maximum is 3600, and the default is 300. If set to 0, the timeout is disabled and the connection will remain open until closed by the network system that is accessing the device.
Locally Administered Address	Specifies a locally administered address (LAA) that replaces the factory-assigned LAN Hardware (MAC) address. If LAA is used, a user-specified string of exactly 12 hexadecimal digits must be entered. For Token Ring print servers, the LAA address must start with hexadecimal 40 through 7F. For Ethernet print servers, the LAA address must start with hexadecimal X2, X6, XA, or XE, where X is any hexadecimal digit 0 through F. The default address is the factory assigned address.

Table 4.8 Miscellaneous Settings (3 of 5)

Item	Description
Syslog Facility	Specify the encoded source facility of a message (for example, to identify the source of selected messages during troubleshooting). By default, the HP Jetdirect print server uses LPR as the source facility code, but local user values of local0 through local7 can be used to isolate individual or groups of print servers.
On fatal error	(Supported external print servers only) Specify the print server's action when it detects a fatal error during operation with the attached device: ● Halt (default): The print server's networking operation is suspended. User intervention will be required. ● Reboot: The print server will restart, similar to when the printer is powered off/on.
Error page type	(Supported external print servers only) Specify the type of diagnostic page that will automatically print on a fatal error. ● Basic (default): A Default Diagnostic Page will print. It is a single page containing an error summary in user-readable form. ● Full: Up to five pages of full diagnostic information will be printed.; These pages will contain detailed status of the print server at the time the error was detected. HP support personnel may be required to interpret the pages. ● None: A diagnostic page will not be printed.
Dynamic Raw Port Setting	Allows additional ports to be specified for printing to TCP port 9100. Valid ports are 3000 to 9000, which are application-dependent.
Disable listening on these ports	For security purposes, two fields allow you to disable services on the printer that use the network. In each field, you must specify the port numbers that are used for network communications with those services. Up to five ports may be specified in each field (for example, [5, 10, 40, 20, 50]). The valid range for port numbers is 1 through 65535. Streams: In this field, enter port numbers of services that pass data streams. Data streams use Transport Control Protocol (TCP) to guarantee data delivery. Datagrams: In this field, enter port numbers of services that pass datagrams. Datagrams, typically used for broadcast messages, use the User Datagram Protocol (UDP), a connectionless protocol where delivery and error recovery are not guaranteed.

Table 4.8 Miscellaneous Settings (4 of 5)

Item	Description
Enable MFP and AIO software support	Enable or disable the print server's support of the full-function scanning facility installed on client computers through software supplied with the HP multifunction device (MFP or All-in-One). If disabled, the print server will not allow client software device functions other than network printing. Support for the print server's Web Scan function is controlled separately.
Enable Web Scan	Enable or disable use of basic scanning through the print server's embedded Web Scan feature. The use of Web Scan is independent of the setting for enabling MFP and AIO device software support, described above.
Enable Scan-to-email	Enable or disable scan-to-email support. When this parameter is enabled, you can scan-to-email as well as download or display scanned files. The scan-to-email feature is available only when a mail server is specified. Specify the email server using the Email (SMTP) Server parameter described above.
mDNS Service Name	Specifies an alphanumeric string of up to 64 ASCII characters assigned to this device or service. This name is persistent and is used to resolve a particular device or service if socket information (such as the IP address) changes from session to session. Apple Rendezvous will display this service. The default service name is the printer model and the LAN Hardware (MAC) address.
mDNS Domain Name	(Read-only parameter) Specifies the mDNS domain name assigned to the device, in the form <host name>.local. If a user-specified host name has not been assigned, the default host name NPIxxxxxx is used, where xxxxxx are the last 6 digits of the LAN hardware (MAC) address.

Table 4.8 Miscellaneous Settings (5 of 5)

Item	Description
mDNS Highest Priority Service	Specifies the mDNS highest priority service to use for printing.To set this parameter, choose one of the following printing options: 9100 Printing: Raw IP printing through HP-proprietary port 9100. IPP Printing: Internet Printing Protocol printing. LPD Printing (RAW): Default LPD raw queue printing. LPD Printing (TEXT): Default LPD text queue printing. LPD Printing (AUTO): Default LPD auto queue printing. LPD Printing (BINPS): Default LPD binary postscript queue printing. LPD Printing (<user-defined>): Up to 5 user-specified LPD queues will be listed if they have been configured, where <user-defined> is the name of the user-specified LPD print queue. The default selection will depend on the printer, typically 9100 Printing or LPD Printing (BINPS).

Firmware Upgrade

For print servers that support firmware upgrades, this page allows you to upgrade the print server with new features.

The firmware upgrade file for the print server must be available on your system. To identify and retrieve the appropriate upgrade file, visit HP online support at:

http://www.hp.com/go/webjetadmin_firmware

On that page, do the following:

1. Locate the print server model and the upgrade file.
2. Check the upgrade file version and verify that it is more recent than the print server's installed version. If it is, then download the file. If not, then you do not need to upgrade.

To upgrade the print server using the embedded Web server:

1. Enter the path to the upgrade file or click **Browse** to locate it.
2. Then click **Upgrade Firmware**.

Note If you are upgrading from a version prior to X.24.00 series, you must perform the upgrade again if supported non-English languages are desired.

LPD Queues

The **LPD Queues** page allows you to specify LPD (line printer daemon) print queues on the Jetdirect print server. For more information on LPD printing and print queues, see Chapter 5, "Configuring for LPD Printing".

LPD printing must be enabled on the print server before you can set LPD queues. If LPD is disabled, go to the Misc. Settings tab to enable it.

If LPD printing is enabled, ten different named print queues are available. Four of these queues are configured automatically and their parameters cannot be changed. The remaining six queues can be defined by the user.

The six user-defined queues can be set up with character strings -- such as job control commands -- that are automatically added before or after the print job. You can define up to eight named strings, and you can set up each queue so that any of these named strings precedes the print data ("prepend string name") or follows the print data ("append string name").

LPD Queue Parameters for setting up LPD queues are described below. See Table 4.9.

Table 4.9 LPD Queue Parameters (1 of 3)

Item	Description
Queue Name	Name of the user-defined queue. This name can be up to 32 characters long, and can consist of any displayable ASCII characters. You can define up to six user-defined queues.
Prepend String Name	Enter the name of one or more strings to be added before (or prepended to) the print data. You specify string names and values in the table at the bottom of the page. To prepend a long string, multiple string names may be concatenated, that is, entered and separated by a "+" character. For example, to prepend a long string that has been divided into two separate strings, enter: <stringname1>+<stringname2> where stringname1 and stringname2 are specified as two separate string names with different values.
Append String Name	Enter the name of one or more strings to be added after (or appended to) the print data. You specify string names and values in the table at the bottom of the page. To append a long string, multiple string names may be concatenated, that is, entered and separated by a "+" character. For example, to append a long string that has been divided into two separate strings, enter: <stringname1>+<stringname2> where stringname1 and stringname2 are specified as two separate string names with different values.

Table 4.9 LPD Queue Parameters (2 of 3)

Item	Description
Queue Type	Processing instruction for the queue. Choose from these four queue types: ● RAW -- No processing. The line printer daemon treats the data in a *raw* queue as a print job that has already been formatted in PCL, PostScript, or HP-GL/2, and sends it to the printer without modification. (Note that any user-defined prepend or append string will be added to the job in the appropriate position.) ● TEXT -- Carriage return added. The line printer daemon treats data in *text* queues as unformatted or ASCII text, and adds a carriage return to each line before sending it to the printer. ● AUTO -- Automatic. The line printer daemon uses autosensing to determine whether the print data should be sent as *raw* or *text*. ● BINPS -- Binary PostScript. This instructs the PostScript interpreter that the printjob is to be interpreted as Binary PostScript data.
Default Queue Name	Name of the queue to be used if the queue specified for a print job is unknown. By default, the Default Queue Name is AUTO.
String Name	Name of a character string. You may define up to eight character strings for use in LPD queues; this parameter names the string, and the *Value* parameter defines the content of the string. *Prepend* and *Append* string names (specified in the table at the top of the browser window) must be chosen from the names specified here. The string name can be up to 32 characters long, and can consist of any displayable ASCII characters.

Table 4.9 LPD Queue Parameters (3 of 3)

Item	Description
Value	The content of the string. The *String Name* parameter names the string; the *Value* parameter defines its content. When a string name is specified for a prepend or append string (in the table at the top of the browser window), the line printer daemon sends the value of that string to the printer before or after the print data (as appropriate). Character values can be anywhere in the extended ASCII range of 0 to 255 (hex 00 to FF). You can specify a non-printing character using its hexadecimal value, by entering a backslash followed by two hexadecimal characters. For example, to enter the escape character (hex 1B), type in \1B. If your string includes the backslash character itself, specify it as \5C. The maximum number of characters you can type into this field is 240. The characters in the field are checked for hexadecimal values, converted if necessary, and stored internally. The maximum number of characters stored internally in the string is 80; any characters that exceed this are discarded.

To set up a user-defined print queue, you first define the strings, assign them as prepend or append strings, and define the queue type. Once you have defined an LPD queue, you specify its use by setting up an LPD printer that uses that queue. For instance, if you set up string “a” with a value of “abc” and string “z” with a value of “xyz”, you can define print queue “az_queue” with a prepend string of “a”, an append string of “z”, and a queue type of “raw”. Then, when you send a print job consisting of <formatted_text> through queue az_queue, the job sent to the printer is “abc<formatted_text>xyz”.

Instructions for setting up an LPD printer are different for different operating systems; refer to Chapter 5, “Configuring for LPD Printing” for details.

Example. If you had an LPD printer and wanted to reset it at the start of each print job, you could set up a user-defined print queue named “clear_printer” that issues a PCL reset command (Escape-E) at the beginning of each job. You could set this up as follows:

First, set up the print queue:

a. Name a string: Type "reset_string" into the String Name field in row 1.

b. Define the string's value: Type "\1BE" (Escape-E) into the Value field in row 1. (Alternatively, you could type "\1B\45".)

c. Name the queue: Type "clear_printer" into the Queue Name field in row 5.

d. Set up the prepend string: Type "reset_string" into the Prepend String field in row 5.

e. Leave the Append String field in row 5 blank.

f. Set the queue type: Using the pull-down menu, set the Queue Type field in row 5 to "RAW".

Then, set up the printer to use the queue, making sure to specify "clear_printer" when asked for a queue name. (For details of setting up the printer, refer to Chapter 5, “Configuring for LPD Printing”.) After that, any print jobs sent to the printer -- either from the server or from a client computer that has set up that printer -- will include a reset command at the beginning of the job.

USB Settings

If the HP Jetdirect print server provides a USB connection to the network device (such as a USB printer), a link to USB configuration parameters will be displayed. See Table 4.10.

Table 4.10 USB Settings

USB Item	Description
USB Speed	(Read-only parameter, for USB 2.0 print servers only). Specifies the autonegotiated communication speed over the USB connection between the print server and the device. ● Full Speed: 12 Mbits/sec as specified in the USB v2.0 specifications, compatible with USB v1.1 specifications. ● Hi-Speed: 480 Mbits/sec for USB v2.0 devices only. ● Disconnected: The USB port is not connected.
Desired Communication Mode	Select the highest level of USB communication capabilities when the print server tries to establish a communication level with the printer. If you change the current setting, unplug and then reconnect the USB cable, or power the print server off/on, to activate it. ● Automatic (default): The print server will attempt to set the highest level available, starting with IEEE 1284.4. If not successful, subsequent levels are attempted. ● IEEE 1284.4: This level is the highest communication level, and allows multiple channels of simultaneous print, scan, and status communication. ● MLC: (Multiple Logical Channels) The next level is MLC, an HP-proprietary protocol that allows multiple channels of simultaneous print, scan, and status communication. ● Bidirectional: This level provides basic two-way printer communications. Print data is sent to the printing device, and status information is returned from the printing device. ● Unidirectional: This is the lowest communication level and provides one-way printer communication from the print server to the printing device. The communication level set by the print server is reported on the Jetdirect configuration page.
Status Page Language	Select the Page Description Language (PDL) for the Jetdirect configuration page data sent to the printer. Available options include PCL, ASCII, PostScript and HPGL2.

Support Info

Use this page to configure links for Support assistance. You can designate a Support person and phone number of an administrator for this device, as well as URL addresses for Web-based product and technical support.

Refresh Rate

The refresh rate is the time period (in seconds) that the diagnostic pages will be automatically updated. The value '0' disables the refresh rate.

Privacy Settings

On the **Privacy Settings** page, you can allow the embedded Web server to collect product identification and use information and then send the information to HP (Internet access is required). Product use information assists HP in improving product features and services. By default, this feature is disabled.

To enable this feature, check the checkbox and click **Apply**.

To disable this feature, clear the checkbox and click **Apply**.

Select Language

This link appears if the HP Jetdirect Web pages support multiple languages. Supported languages may also be selected through language preference settings in your browser (see your browser's Help).

To display supported non-English languages, the use of cookies must be enabled in your browser settings.

Settings

In the **SECURITY** section, the **Settings** menu provides access to the following tabs: **Status** (default), **Wizard**, **Restore Defaults**. The available settings depend on your particular print server model. Value-based, non-upgradeable HP Jetdirect print servers (for example HP Jetdirect 175x and 200m) do not support a secure embedded Web server.

Status

The **Status** page displays the current security configuration settings of the print server. The settings that will be displayed depend on the features supported by the print server.

Wizard

Note If you use HP Web Jetadmin to manage your devices, you should not use this wizard. Instead, use HP Web Jetadmin to configure your network security settings to ensure they are properly set for your network.

The **Wizard** page allows you to run the *HP Jetdirect Security Configuration Wizard*. This wizard will guide you through the print server's security configuration needed for your network. Click **Start Wizard** to run the wizard. This opens the **Security Level** page.

The optional configuration parameters presented by the wizard will depend on your choice of security level. For an overview, see Table 4.11.

Note If you improperly exit the wizard (for example, by failing to use the Cancel button), an *Operation Failed* screen may appear. If so, wait approximately two minutes before entering the wizard again.

Restore Defaults

This page is used to restore security configuration settings to factory defaults. The default settings displayed depend on the features supported by the print server.

Only the security settings listed are restored to factory defaults, other configuration settings are not affected.

Table 4.11 Wizard Security Levels (1 of 2)

Security Level	Description
Basic Security	This option requires that you configure an administrator password for configuration management. The administrator password is shared with other management tools, such as Telnet and SNMP applications. However, some management tools, such as Telnet, use plain-text communications and are not secure. The **Administrator Account** page is used to enter the administrator password. The Administrator Password will also be used as the SNMP v1/v2 Set Community Name for SNMP management applications. The **Configuration Review** page displays all the current settings that may affect security. Click **Finish** to set your basic security selections.
Enhanced Security (Recommended)	This option adds to Basic Security by automatically disabling management protocols that are do not use secure, encrypted communications (such as Telnet and FTP firmware updates, RCFG, SNMP v1/v2c). To change individual protocol settings, see Mgmt. Protocols. The **Administrator Account** page is used to enter the administrator password. **SNMP Configuration** pages are used to configure specific SNMP settings: ● Enable SNMPv3: (Full-featured print servers only) Enable SNMP v3 and create an SNMP v3 account. Creating an SNMP v3 account is not recommended if you manage devices using HP Web Jetadmin. See SNMP. ● Enable SNMPv1/v2 read-only access: Enable this option to allow support of current tools that rely on SNMP v1/v2 for device discovery and status. The **Configuration Review** page displays all the current settings that may affect security. Click **Finish** to set your basic security selections.

Table 4.11 Wizard Security Levels (2 of 2)

Security Level	Description
Custom Security	This option proceeds through all available security settings supported by your print server. For more information on specific parameters and selections, see the tabs on the **Mgmt. Protocols** and **Authorization** menu pages under **SECURITY**. The **Administrator Account** page is used to enter the administrator password. The **Web Mgmt.** page (for full-featured print servers only) is used for HTTPS (secure HTTP) configuration, including certificates and encryption levels. The **Management Tools** page allows configuration of management protocols that are not secure (such as RCFG, Telnet and FTP firmware updates). **SNMP Configuration** pages are used to configure specific SNMP settings: ● Enable SNMPv1/v2: Enable this option to allow management software that use SNMP v1/v2. If selected the SNMPv1/v2 Configuration page is displayed to configure SNMP community names. ● Enable SNMPv3: (Full-featured print servers only) Enable this option to create an SNMP v3 account. Creating an SNMP v3 account is not recommended if you manage devices using HP Web Jetadmin. See SNMP. The **Authorization** page is used to set up an Access Control List, if desired to control host access to the device. The **Print Protocols and Services** page is used to enable or disable network printing, print services, and device discovery protocols that may affect security. The **Configuration Review** page displays all the current settings that may affect security. Click **Finish** to set your basic security selections.

Authorization

The **Authorization** page provides tabs that allow you to control access to the device, as well as to device configuration and management features. In addition, you may configure certificates for client and server authentication.

Admin. Account

Use this page to set an administrator password for controlled access to Jetdirect configuration and status information. The administrator password is shared by Jetdirect configuration tools, such as the embedded Web server, Telnet, and HP Web Jetadmin. In addition, for selected EIO printers, the password is shared with the printer (see Printer Password Synchronization below).

If a password is set and you attempt to access Jetdirect print server settings, you will be prompted for a user name and *this password* before you are allowed access.

Note The administrator password may be cleared by a cold reset of the print server, which resets the print server to factory default settings.

A checkbox allows you to synchronize HP Web Jetadmin and the SNMP v1/v2c Set Community Name.If you enable this feature (the checkbox is checked), the administrator password will also be used as the SNMP Set Community Name for SNMP v1/v2c management applications.

Note If you subsequently change the SNMP Set Community Name (for example, using the SNMP tab on the **Network Settings** page or from Web Jetadmin), the two settings will no longer be synchronized.

Printer Password Synchronization. Many EIO printers provide password-protected access to printer configuration and status settings. The password is set through security Web pages provided by the printer. For these printers, the administrator password for the printer and the Jetdirect print server are synchronized so that the same password is used to access both printer and networking configuration pages. For printers that support password synchronization, the same password is used regardless of the embedded Web page (printer **Security** page or networking **Admin. Account** page) in which the password was set.

If password synchronization is lost on these printers, recovery may require one of the following procedures:

- Restore both the printer and the Jetdirect print server to factory-default states (for example, through a cold-reset), and then reconfigure your settings.
- Manually set the same administrator password using both the printer **Security** page and the networking **Admin. Account** page.

Certificates

(Full-featured HP Jetdirect print servers only) This tab provides access to installation, configuration and management services for X.509 digital certificates. A digital certificate is an electronic message typically containing, among other things, a key (a short string used for encryption and decryption) and a digital signature. Certificates may be issued and signed by a trusted third party (commonly called a Certificate Authority, or CA), which may exist internal or external to the organization. Or certificates may be “self-signed”, which is similar to validating your own identity.

Note While self-signed certificates are permitted and allow data encryption, they do not ensure valid authentication.

The **Certificates** page provides the status of the certificates installed on the HP Jetdirect print server:

- **Jetdirect certificate.** The Jetdirect certificate is used to validate the identity of the Jetdirect device to clients and to network authentication servers.

By factory default, a self-signed Jetdirect certificate is preinstalled. For wireless print servers, this allows the embedded Web server to use HTTPS and appear as a secure site when initially accessed from your Web browser.

Click **View** to view the contents of an installed Jetdirect certificate, or click **Configure** to update or install a new one. See Configuring Certificates.

When installed, a Jetdirect certificate will be saved across a cold-reset, which is used to restore the print server to factory-default values.

- **CA Certificate.** (Wireless print servers only) A certificate from a trusted third party, or Certificate Authority (CA), is used to validate the identity of a network authentication server during selected authentication methods that use EAP (Extensible Authentication Protocol). The authentication server's identity is validated when information on the CA certificate matches the information on a certificate received from the authentication server.

  A CA certificate for the print server is a certificate that was used to sign the authentication server's certificate. Therefore, the Certificate Authority for the authentication server's certificate must also be used for the CA certificate.

  Click **View** to view the contents of an installed Jetdirect certificate, or click **Configure** to update or install a new one. See Configuring Certificates.

  A CA certificate is not saved when the print server is reset to factory-default values.

The maximum certificate size that can be installed on the HP Jetdirect print server is 3072 bytes.

Configuring Certificates

When you click **Configure**, a certificate management wizard will help you update or install a certificate. The screens displayed will depend on the type of certificate (Jetdirect or CA) and your selections. Table 4.12 provides a description of the screens and configuration parameters that may appear.

Note If you improperly exit Certificates configuration (for example, by failing to use the **Cancel** button), an *Operation Failed* screen may appear. If so, wait approximately two minutes before entering the wizard again.

Table 4.12 Certificate Configuration Screens (1 of 4)

Certificate Options Choose from the options listed.
Update Pre-Installed Certificate. Use this option to update the preinstalled, self-signed certificate. When updated, the preinstalled certificate is overwritten.You may update the following item: ● Certificate Validity Period With self-signed certificates, the browser will identify the certificate as self-signed for each new Web session and may cause a security alert message. This message can be bypassed if the user adds it to their browser's certificate store or disables browser alerts (not recommended). Self-signed certificates are not necessarily secure because the certificate owner is merely confirming his own identity instead of verification by a trusted third party. Certificates from a trusted third party are considered more secure.
Create Certificate Request. Using this option, you are prompted for specific device and organizational information in the following screen: ● Certificate Information This option may be used, for example, when a wireless authentication protocol requires that a Jetdirect certificate issued by a trusted third party or Certificate Authority be installed.
Install Certificate. This option is displayed only if there is a Jetdirect certificate request (to a trusted third party) pending. When received, the certificate is installed using this option. Once installed, this certificate overwrites the preinstalled certificate. Using this option, you are prompted for information in the following screen: ● Install Certificate The certificate to be installed must be associated with a previous certificate request generated by the embedded Web server.

Table 4.12 Certificate Configuration Screens (2 of 4)

Install CA Certificate. (Wireless print servers only) This option is provided when you click **Configure** for a CA certificate, which must be installed for selected wireless authentication protocols. Using this option, you are prompted for information in the following screen: ● Install Certificate
Import Certificate and Private Key. This option allows you to import a previously acquired and known certificate as the Jetdirect certificate. If you import a certificate, the currently installed certificate will be overwritten. Using this option, you are prompted by the following screen: ● Import Certificate and Private Key
Export Certificate and Private Key. This option allows you to export the Jetdirect certificate currently installed on the print server for use on other print servers. Using this option, you are prompted by the following screen: Export the Jetdirect certificate and private key.
Delete CA Certificate. (Wireless print servers only) This option is used to remove the CA certificate installed on the Jetdirect print server. This option appears when a CA certificate for EAP authentication has been installed. **CAUTION:** If the CA Certificate is deleted, EAP authentication will be disabled and network access will be denied. The CA Certificate will also be removed on a cold-reset of the print server, where factory-default settings are restored.
Certificate Validity Use this screen to specify how long the Jetdirect self-signed certificate will be valid.
This screen appears only when a self-signed certificate is preinstalled and you click **Edit Settings** to update the validity period. It specifies the current Coordinated Universal Time (UTC). UTC is a time scale maintained by the International Bureau of Weights and Measures. It adjusts for differences between Greenwich Mean Time and atomic time. It is set at 0 degrees longitude on the prime meridian. The **Validity Start Date** is calculated from the PC's clock settings. The **Validity Period** specifies the number of days (1 to 3650) that the certificate is valid, starting from the Validity Start Date. A valid entry (1 to 3650) is required. The default is 5 years.

Table 4.12 Certificate Configuration Screens (3 of 4)

Certificate Information Use this page to enter information for requesting a certificate from a Certificate Authority.
Common Name. (Required) For HP Jetdirect print servers, specify the fully qualified domain name or a valid IP address for the device. Examples: ● Domain Name: *myprinter.mydepartment.mycompany.com* ● IP address: *192.168.2.116* The Common Name will be used to uniquely identify the device. For HP Jetdirect wireless print servers using EAP authentication, some authentication servers may need to be configured with the Common Name as specified on the certificate. If the default IP address 192.0.0.192 is configured on the Jetdirect print server, it will not likely be valid for your network. You should not use this default address to identify your device.
Organization. (Required) Specify the full legal name for your company.
Organizational Unit. (Optional) Specify your department, division, or other subgroup of your organization.
City/Locality. (Required) Enter the city or locality in which your organization is located.
State/Province. (Required for all countries/regions) Must contain at least three characters. (required)
Country/Region. Two-character ISO 3166 country/region code. For example, use "gb" Great Britain or "us" for USA (required).
Install Certificate, or **Install CA Certificate** Use the ”Install Certificate” screen to install a Jetdirect certificate. Use the ”Install CA Certificate” screen to install a trusted Certificate Authority (CA) certificate for use during EAP/TLS authentication. (Wireless print servers only)

Table 4.12 Certificate Configuration Screens (4 of 4)

Install a PEM/Base64 (Privacy Enhanced Mail) encoded certificate. To install a certificate, specify the name and path of the file that contains the certificate. Or, click **Browse** to browse your system for the file. Click Finish to complete the installation. To install a certificate, it must be associated with a pending certificate request by the embedded Web server. The Install Certificate option will not be presented if there is no pending request. A Jetdirect or CA certificate size is limited to 3 KBytes.
Import Certificate and Private Key Use this screen to import a Jetdirect certificate and private key.
Import a Jetdirect certificate and private key. When imported, the existing certificate and private key will be overwritten. The file format must be PKCS#12 encoded (.pfx) and cannot exceed 4 KBytes. To import a certificate and private key, specify the name and path of the file that contains the certificate and private key. Or, click **Browse** to browse your system for the file. Then enter the password that was used to encrypt the private key. Click **Finish** to complete the installation.
Export the Jetdirect certificate and private key. Use this screen to export the installed Jetdirect certificate and private key to a file.
To export a certificate and private key, enter a password that will be used to encrypt the private key. You must enter the password again to confirm it. Then click **Save As** to save the certificate and private key in a file on your system. The file format will be PKCS#12 encoded (.pfx).

Access Control

Use this tab to display the Access Control List (ACL) on the HP Jetdirect print server. An access control list (or host access list) specifies individual host systems, or networks of host systems, that will be allowed to access the print server and the attached network device. Up to 10 entries can be included on the list. If the list is empty (no hosts are listed), any supported system can access the print server.

CAUTION Use caution when using this feature. You may lose your ability to communicate with the HP Jetdirect print server if your system is not properly specified in the list, or access through HTTP is disabled.

For use of the host access list as a security feature, see Chapter 7.

Note By default, hosts with HTTP connections (for example, through the embedded Web server or IPP -- the Internet Printing Protocol) are allowed access to the print server regardless of access control list entries. To disable access by HTTP hosts, clear the checkbox at the bottom of the list.

Host systems are specified by their IP addresses or network number. If the network contains subnets, an address mask may be used to identify whether the IP address designates an individual host system or a group of host systems.

Examples. See the table of sample entries below:

IP Address	Mask	Description
192.0.0.0	255.0.0.0	Allow all hosts with network number 192.
192.1.0.0	255.1.0.0	Allow all hosts on network 192, subnet 1.
192.168.1.2		Allow the host with IP address 192.168.1.2. The mask 255.255.255.255 is assumed and is not required.

To add an entry into the access control list, use the **IP Address** and **Mask** fields to specify a host, and click (check) the **Save** checkbox for that entry. Then click **Apply**.

To delete an entry from the list, clear the **Save** checkbox for that entry. Then click **Apply**.

To clear the entire access control list, clear all **Save** checkboxes, and click **Apply**.

Mgmt. Protocols

This link provides access to management communications and other protocols that affect security.

Web Mgmt.

Use this tab to manage communications with the embedded Web server from Web browsers. This tab appears only for full-featured print servers.

Secure, encrypted Web-based communications is provided through the Secure HTTP (HTTPS) protocol. If configured to require HTTPS, the embedded Web server routes HTTPS communications through port 443, the well-known port for HTTPS traffic. Although ports 80, 280, or 631 continue for Internet Printing Protocol (IPP) use, other non-secure communications (HTTP) are redirected to HTTPS. Redirection of your browser to use HTTPS may be transparent depending on your browser's capabilities.

HP *wireless* print servers, by factory default, are configured to require HTTPS communications. HP *wired* print servers, by factory default, are configured to allow HTTPS or HTTP.

Although not recommended, you may choose to accept both HTTPS and HTTP communications that are not secure by disabling (clearing) the **Encrypt All Web Communication** checkbox.

To support the use of HTTPS communications, a Jetdirect certificate must be installed. A factory-default, self-signed certificate is preinstalled for initial use. Click the **Configure** button to update the preinstalled certificate, or to install a new one. For more information, see Configuring Certificates.

Encryption strength must be specified when using a Jetdirect certificate. You may select **Low** (default), **Medium**, or **High** encryption strength.

For each encryption strength, ciphers are specified to identify the weakest cipher allowed. Early browsers may only support 40-bit (Low) encryption levels.

Note

Cipher suites support different levels of encryption strength. The cipher suites currently supported for encryption and decryption are DES (Data Encryption Standard, 56-bit), RC4 (40-bit or 128-bit), and 3DES (168-bit).

SNMP

Use this tab to enable or disable SNMP v1, v2c and v3 agents on the print server, depending on the print server model. Value-based print servers do not support an SNMP v3 agent. For a description of SNMP selections, see Table 4.7.

SNMP v3. The HP Jetdirect print server includes an SNMP v3 (Simple Network Management Protocol, version 3) agent, for enhanced SNMP security. The SNMP v3 agent employs a User-based Security Model for SNMP v3 (RFC 2574), which features user-authentication and data privacy through encryption.

The SNMP v3 agent is enabled when an initial SNMP v3 account on the print server is created. Once the account is created, any SNMP management application, if properly configured, can access or disable the account.

CAUTION

If you use HP Web Jetadmin to manage your devices, you should use HP Web Jetadmin to seamlessly configure SNMP v3 and other security settings on the print server.

Using the embedded Web server to create the SNMP v3 account will erase any existing SNMP v3 accounts. In addition, the SNMP v3 account information will need to be implemented on the SNMP management application.

You may create the initial account by specifying the HMAC-MD5 authentication and CBC-DES data privacy encryption keys used by your SNMP v3 management application.

CAUTION You should disable Telnet and ensure secure embedded Web communications through HTTPS is enabled before creating the initial SNMP v3 account. This will help to prevent access or interception of account information over a connection that is not secure.

SNMP v1 and v2c agents can coexist with the SNMP v3 agent. However, to fully secure SNMP access, you should disable SNMP v1 and v2c.

Other

Use this tab to enable or disable various protocols supported by the print server for printing, print services, and management. See Table 4.13.

Table 4.13 Other Protocols (1 of 2)

Item	Description
Enable Print Protocols	Enable or disable network protocols supported by the print server: IPX/SPX, AppleTalk, DLC/LLC. For example, you should disable unused protocols to prevent printer access using those protocols. For network environments that use these protocols, see Chapter 1. Because it uses TCP/IP, the embedded Web server does not allow disabling TCP/IP.
Enable Print Services	Enable or disable various print services supported by the print server: port 9100, LPD (Line Printer Daemon), IPP (Internet Printing Protocol), FTP (File Transfer Protocol). Disable unused print services to prevent access through those services.

Table 4.13 Other Protocols (2 of 2)

Item	Description
Enable Device Discovery	Enable or disable device discovery protocols supported by the print server: SLP (Service Location Protocol). If enabled (checked), the HP Jetdirect print server sends SLP packets, which are used by system applications for automated discovery and installation. If disabled (cleared), SLP packets are not sent. mDNS (multicast Domain Name System). If enabled (checked), Multicast Domain Name System (mDNS) services are provided. mDNS is typically used on small networks for IP address and name resolution (through UDP port 5353) where a conventional DNS server is not used. Multicast IPv4. If enabled (checked), the print server will send and receive IP version 4 multicast packets.
Enable Management Protocols	Enable or disable Telnet access and the use of FTP to upgrade firmware on the print server. Telnet and FTP are not secure protocols and device passwords may be intercepted. Enable or disable RCFG, a remote IPX configuration protocol used by older management tools to configure Novell NetWare parameters. Disabling RCFG does not affect direct mode printing using IPX/SPX. Disabling Telnet, FTP firmware upgrades, and RCFG is recommended.

Wireless

Use this link to manage secure wireless configuration settings. For the features and parameter settings on this page, see Table 4.3.

Network Statistics

This page is used to display counter values and other status information currently stored on the HP Jetdirect print server. This information is often useful to diagnose performance and operational problems associated with the network or network device.

Protocol Info

This page provides a list of various network configuration settings on the HP Jetdirect print server for each protocol. Use these lists to validate your desired settings.

Configuration Page

This page provides a view of the HP Jetdirect configuration page that contains a summary of HP Jetdirect status and configuration information. The contents of this page are described in Chapter 9.

Other Links

Support

The information displayed on the **Support** page depends on the values configured in the Support Info tab in the Other Settings menu. Support information may include the name and telephone number of a Support person, or Web links to Product and Technical Support pages. The default Web links include HP online support and HP product information Web pages (Internet access is required).

HP Web Jetadmin

HP Web Jetadmin is HP's premier network peripheral management software tool.

A link to HP Web Jetadmin will be displayed only if HP Web Jetadmin has discovered this device through an “Integration URL”. You can then use HP Web Jetadmin to provide enhanced management capabilities for this and other HP Jetdirect-connected devices on your network.

HP Home

HP Home provides a link to Hewlett-Packard’s home page on the HP Web site (Internet access is required). This link may also be accessed by clicking on the HP logo.

Help

The **Help** page in the **Networking** tab provides a quick summary of the HP Jetdirect embedded Web server features. In the **Help** page, a link to the latest information on the embedded Web server is provided (Internet access is required).

5

Configuring for LPD Printing

Introduction

The HP Jetdirect print server contains an LPD (Line Printer Daemon) Server module to support LPD printing. This chapter describes how to configure the HP Jetdirect print server for use with various systems that support LPD printing. These instructions include:

- LPD on UNIX Systems
  - Configuring BSD-based UNIX systems using LPD
  - Configuring print queues using the SAM utility (HP-UX systems)
- LPD on Windows NT/2000 Systems
- LPD on Mac OS Systems

Note For other systems not listed, refer to your operating system documentation and online help.

Recent versions of Novell NetWare (NetWare 5.x with NDPS 2.1 or greater) support LPD printing. For setup instructions and support, refer to the documentation supplied with NetWare. Also, refer to the Technical Information Documentation (TID) on Novell's support Web site.

About LPD

Line Printer Daemon (LPD) refers to the protocol and programs associated with line-printer spooling services that may be installed on various TCP/IP systems.

Some of the widely used systems in which the HP Jetdirect print server functionality supports LPD include:

- Berkeley-based (BSD) UNIX systems
- HP-UX
- Solaris
- IBM AIX
- Linux
- Windows NT/2000
- Mac OS

The UNIX configuration examples in this section show the syntax for BSD-based UNIX systems. The syntax for your system may vary. See your system documentation for the correct syntax.

Note The LPD functionality can be used with any host implementation of LPD that complies with the RFC 1179 document. The process for configuring printer spoolers, however, may differ. See your system documentation for information on configuring these systems.

The LPD programs and protocol include the following:

Table 5.1 LPD Programs and Protocols

Program Name	Purpose of Program
lpr	Queues jobs for printing
lpq	Displays print queues
lprm	Removes jobs from print queues
lpc	Controls print queues
lpd	Scans and prints the files if the specified printer is connected to the system. If the specified printer is connected to another system, this process forwards the files to an lpd process on the remote system where the files are to be printed.

Requirements for Configuring LPD

Before you can use LPD printing, your printer must be properly connected to the network through the HP Jetdirect print server, and you must have print server status information. This information is listed on the HP Jetdirect printer configuration page. If you have not printed a configuration page from your printer, see the hardware installation guide for your print server or your printer documentation for instructions. You must also have the following:

- An operating system that supports LPD printing.
- Superuser (root) or Administrator access to your system.
- The LAN hardware address (or station address) of the print server. This address is printed with print server status information on the HP Jetdirect configuration page and is of the form:

  HARDWARE ADDRESS: xxxxxxxxxxxx

  where x is a hexadecimal digit (for example, 0001E6123ABC).
- An IP address configured on the HP Jetdirect print server.

LPD Setup Overview

The following steps are necessary to configure the HP Jetdirect print server for LPD printing:

1. Setting up IP parameters.
2. Setting up print queues.
3. Printing a test file.

The following sections provide detailed descriptions for each step.

Step 1. Setting Up IP Parameters

To set up IP parameters on the HP Jetdirect print server, refer to Chapter 3. For more information on TCP/IP networks, refer to Appendix A.

Step 2. Setting Up Print Queues

You must set up a print queue for each printer or printer personality (PCL or PostScript) you use on your system. Also, different queues are required for formatted and unformatted files. The queue names `text` and `raw` in the following examples (see `rp` tag) have special meanings.

Table 5.2 Supported Queue Names

`raw, raw1, raw2, raw3`	no processing
`text, text1, text2, text3`	carriage return added
`auto, auto1, auto2, auto3`	automatic
`binps, binps1, binps2, binps3`	binary PostScript
`(user-defined)`	defined by user; optionally including command strings before and after the print data

The line printer daemon on the HP Jetdirect print server treats data in the `text` queue as unformatted text or ASCII, and adds a carriage return to each line before sending it to the printer. (Note that the actual observed behavior is that a PCL line termination command (value of 2) is issued at the beginning of the job.)

The line printer daemon treats data in the `raw` queue as formatted files in PCL, PostScript, or HP-GL/2 languages and sends the data without change to the printer.

Data in the `auto` queue will be automatically processed as text or raw, as appropriate.

For the `binps` queue, the PostScript interpreter interprets the print job as binary PostScript data.

For user-defined queue names, the line printer daemon adds user-defined strings before or after the print data (user-defined print queues can be set up through Telnet, Chapter 3, or the embedded Web server, Chapter 4).

If the queue name is not one of the above, the HP Jetdirect print server assumes it to be `raw1`.

Step 3. Printing a Test File

Print a test file using the LPD commands. For instructions, see the information provided for your system.

LPD on UNIX Systems

Configuring Print Queues for BSD-based Systems

Edit the /etc/printcap file to include the following entries:

```
printer_name|short_printer_name:\
:lp=:\
:rm=node_name:\
:rp=remote_printer_name_argument:\
```
(this should be text, raw, binps, auto, or user-defined)
```
:lf=/usr/spool/lpd/error_log_filename:\
:sd=/usr/spool/lpd/printer_name:
```

where printer_name identifies the printer to the user, node_name identifies the printer on the network, and remote_printer_name_argument is the print queue designation.

For more information on printcap, see the printcap man page.

Example: Printcap Entries for ASCII or Text Printers

```
lj1_text|text1:\
:lp=:\
:rm=laserjet1:\
:rp=text:\
:lf=/usr/spool/lpd/lj1_text.log:\
:sd=/usr/spool/lpd/lj1_text:
```

Example: Printcap Entries for PostScript, PCL, or HP-GL/2 Printers

```
lj1_raw|raw1:\
:lp=:\
:rm=laserjet1:\
:rp=raw:\
:lf=/usr/spool/lpd/lj1_raw.log:\
:sd=/usr/spool/lpd/lj1_raw:
```

If your printer does not support automatic switching between PostScript, PCL, and HP-GL/2 languages, use the printer's control panel (if the printer has one) to select the printer language or rely on the application to select the printer language via commands embedded in the print data.

Make sure your users know the printer names for the printers, since they must type those names on the command line for printing.

Create the spooling directory by making the following entries. At the root directory, type:

```
mkdir /usr/spool/lpd
cd /usr/spool/lpd
mkdir printer_name_1 printer_name_2
chown daemon printer_name_1 printer_name_2
chgrp daemon printer_name_1 printer_name_2
chmod g+w printer_name_1 printer_name_2
```

where `printer_name_1` and `printer_name_2` refer to the printers to be spooled. You may spool several printers. The following example shows the command to create the spooling directories for printers used for text (or ASCII) printing and for PCL or PostScript printing.

Example: Creating Spooling Directory for Text and PCL/PostScript Printers

```
mkdir /usr/spool/lpd
cd /usr/spool/lpd
mkdir lj1_text lj1_raw
chown daemon lj1_text lj1_raw
chgrp daemon lj1_text lj1_raw
chmod g+w lj1_text lj1_raw
```

Configuring Print Queues Using SAM (HP-UX systems)

On HP-UX systems you can use the SAM utility to configure remote print queues for printing “text” (ASCII) files or “raw” (PCL, PostScript, or other printer language) files.

Before you execute the SAM program, select an IP address for the HP Jetdirect print server and set up an entry for it in the `/etc/hosts` file on your system running HP-UX.

1. Start the SAM utility as a superuser.
2. Select **Peripheral Devices** from the *Main* menu.
3. Select **Printers/Plotters** from the *Peripheral Devices* menu.
4. Select **Printers/Plotters** from the *Printers/Plotters* menu.
5. Select **Add a Remote Printer** from the *Actions* list, then select a printer name.

   Examples: `my_printer or printer1`
6. Select a remote system name.

   Example: `jetdirect1` (node name of the HP Jetdirect print server)
7. Select a remote printer name.

   Type `text` for ASCII or `raw` for PostScript, PCL, or HP-GL/2.

   Type `auto` to let the line printer daemon select automatically.

   Type `binps` to instruct the PostScript interpreter to interpret the print job as binary PostScript data.

   Type the name of a user-defined queue to include pre-defined strings before and/or after the print data (user-defined print queues can be set up through Telnet, Chapter 2, and the embedded Web server, Chapter 4).
8. Check for a remote printer on a BSD system. You must type `Y`.
9. Click **OK** at the bottom of the menu. If the configuration is successful, the program prints the message:

   ```
   The printer has been added and is ready to accept
   print requests.
   ```

10. Click **OK** and select **Exit** from the *List* menu.

11. Select **Exit Sam**.

Note By default, the lpsched is not running. Make sure you turn the scheduler on when you set up your print queues.

Printing a Test File

To verify that the printer and print server connections are correct, print a test file.

1. At the UNIX system prompt type:

   `lpr -Pprinter_name file_name`

   where `printer_name` is the designated printer and `file_name` refers to the file to be printed.

   Examples (for BSD-based systems):

   Text File: `lpr -Ptext1 textfile`
   PCL File: `lpr -Praw1 pclfile.pcl`
   PostScript File: `lpr -Praw1 psfile.ps`
   HP-GL/2 File: `lpr -Praw1 hpglfile.hpg`

   For HP-UX systems, substitute `lp -d` *for* `lpr -P`.

2. To get print status, type the following at the UNIX prompt:

   `lpq -Pprinter_name`

   where `printer_name` is the designated printer.

   Examples (for BSD-based systems):

   `lpq -Ptext1`
   `lpq -Praw1`

   For HP-UX systems, substitute `lpstat` *for* `lpq -P` *to get print status.*

This completes the process for configuring the HP Jetdirect print server to use LPD.

LPD on Windows NT/2000 Systems

This section describes how to configure Windows NT/2000 networks to use the HP Jetdirect LPD (Line Printer Daemon) services.

The process consists of two parts:

- Installing TCP/IP software (if not already installed).
- Configuring a network LPD printer.

Installing TCP/IP Software (Windows NT)

This procedure lets you check whether you have TCP/IP installed on your Windows NT system, and to install the software if necessary.

Note You may need your Windows System distribution files or CD-ROMs to install TCP/IP components.

1. To check whether you have Microsoft TCP/IP Printing protocol and TCP/IP printing support:

   - Windows 2000—Click **Start**, **Settings**, **Control Panel**. Then double-click the **Network and Dial-up Connections** folder. Double-click the **Local Area Connection** for your network and click **Properties**.

     If Internet Protocol (TCP/IP) is listed and enabled in the list of components used by this connection, the necessary software is already installed. (Proceed to "Configuring a Network Printer for Windows 2000 Systems"). If not, go to step 2.

   - NT 4.0—Click **Start**, **Settings**, **Control Panel**. Then double-click the **Network** option to display the *Network* dialog box.

     If TCP/IP Protocol is listed in the **Protocols** tab, and Microsoft TCP/IP Printing is listed in the **Services** tab, you have already installed the necessary software. (Proceed to "Configuring a Network Printer for Windows NT 4.0 Systems.") If not, go to step 2.

2. If you have not previously installed the software:
   - Windows 2000—In the *Local Area Connection Properties* window, click **Install**. In the *Select Network Component Type* window, select **Protocol** and click **Add** to add the **Internet Protocol (TCP/IP)**.

     Follow the instructions on the screen.
   - NT 4.0—Click the **Add** button for each tab and install the **TCP/IP Protocol** and the **Microsoft TCP/IP Printing** service.

     Follow the instructions on the screen.

     When prompted, type the full path to the Windows NT distribution files (you may need your Windows NT workstation or server CD-ROM).
3. Enter TCP/IP configuration values for the computer:
   - Windows 2000—On the **General** tab in the *Local Area Connection Properties* window, select **Internet Protocol (TCP/IP)** and click **Properties**.
   - NT 4.0—You may be automatically prompted for TCP/IP configuration values. If not, select the **Protocols** tab in the *Networks* window and select **TCP/IP Protocol**. Then click **Properties**.

   If you are configuring a Windows server, type the IP address, default gateway address, and subnet mask in the appropriate spaces.

   If you are configuring a client, check with your Network Administrator to learn whether you should enable automatic TCP/IP configuration or whether you should type a static IP address, default gateway address, and subnet mask in the appropriate spaces.
4. Click **OK** to exit.
5. If prompted, exit Windows and restart your computer for the changes to take effect.

Configuring a Network Printer for Windows 2000 Systems

Set up the default printer by performing the following steps.

1. Verify that the Print Services for Unix is installed (required for LPR port availability):
    a. Click **Start**, **Setup**, and **Control Panel**. Double-click the **Network and Dial-up Connections** folder.
    b. Click the **Advanced** menu and select **Optional Networking Components**.
    c. Select and enable **Other Network File and Print Services**.
    d. Click **Details**, and verify that **Print Services for Unix** is enabled. If not, enable it.
    e. Click **OK**, and then **Next**.
2. Open the **Printers** folder (from the Desktop, click **Start**, **Settings**, and **Printers**).
3. Double-click **Add Printer**. From the Add Printer Wizard welcome screen, click **Next**.
4. Select **Local printer**, and disable automatic detection for Plug and Play printer installation. Click **Next**.
5. Choose **Create a new port**, and select **LPR Port**. Click **Next**.
6. In the *Add LPR compatible printer* window:
    a. Enter the DNS name or IP address of the HP Jetdirect print server.
    b. For the name of the printer or print queue on the HP Jetdirect print server, enter (in lowercase) **raw**, **text**, **auto**, **binps**, or the name of a user-defined print queue (user-defined print queues can be set up through the embedded Web server, see Chapter 4).
    c. Then click **OK**.

Note

The HP Jetdirect print server treats text files as unformatted text or ASCII files. Files that are raw are formatted files in PCL, PostScript, or HP-GL/2 printer languages.

If the queue type is *binps*, the PostScript interpreter is instructed to interpret the print job as binary PostScript data.

For a three-port HP Jetdirect external print server, attach a port number to the queue name (for example, `raw1`, `raw2`, or `raw3`).

7. Select the Manufacturer and Printer model. (If necessary, click **Have Disk** and follow the instructions to install the printer driver.) Click **Next**.
8. Choose to keep the existing driver, if prompted. Click **Next**.
9. Enter a printer name, and choose whether this printer will be the default printer. Click **Next**.
10. Choose whether this printer will be available to other computers. If shared, enter a share name that identifies the printer to other users. Click **Next**.
11. If desired, enter a location and other information for this printer. Click **Next**.
12. Choose whether to print a test page, and click **Next**.
13. Click **Finish** to close the wizard.

Configuring a Network Printer for Windows NT 4.0 Systems

At the Windows NT 4.0 system, set up the default printer by performing the following steps.

1. Click **Start**, select **Settings**, and click **Printers**. The *Printers* window opens.
2. Double-click **Add Printer**.
3. Select **My Computer**, then click **Next**.
4. Click **Add Port**.
5. Select **LPR Port**, and click **New Port**.
6. In the *Name or address of server providing lpd* box, type the IP address or DNS name of the HP Jetdirect print server.

Note NT clients can enter the IP address or name of the NT server that is configured for LPD printing.

7. In the *Name of printer or print queue on that server* box, type (in lowercase) `raw`, `text`, `binps`, `auto`, or the name of a user-defined print queue (user-defined print queues can be set up through the embedded Web server, see Chapter 4). Then click **OK**.

   The HP Jetdirect print server treats *text* files as unformatted text or ASCII files. Files that are *raw* are formatted files in PCL, PostScript, or HP-GL/2 printer languages. If the queue type is *binps*, the PostScript interpreter is instructed to interpret the print job as binary PostScript data.

Note For a three-port HP Jetdirect external print server, attach a port number to the queue name (for example, `raw1`, `raw2`, or `raw3`).

8. Ensure that the port is selected in the *Add Printer* list of the available ports, then click **Next**.
9. Follow the remaining instructions on the screen to complete the configuration.

Verifying the Configuration

From within Windows NT, print a file from any application. If the file prints correctly, the configuration was successful.

If the print job is not successful, try printing directly from DOS using the following syntax:

```
lpr -S<ipaddress> -P<queuename> filename
```

where `ipaddress` is the IP address of the print server, `queuename` is the name “raw” or “text” and `filename` is the file you wish to print. If the file prints correctly, the configuration was successful. If the file does not print, or prints incorrectly, see Chapter 8.

Printing from Windows Clients

If the LPD printer on the NT/2000 server is shared, Windows clients can connect to the printer on the NT/2000 server using the Windows Add Printer utility in the Printers folder.

LPD on Windows XP Systems

This section describes how to configure Windows XP networks to use the HP Jetdirect LPD (Line Printer Daemon) services.

The process consists of two parts:

- Adding Windows Optional Networking Components
- Configuring a Network LPD Printer.

Adding Windows Optional Networking Components

1. Click **Start**.
2. Click **Control Panel**.
3. Click **Network and Internet Connections**.
4. Click the **Network Connections** icon.
5. Select **Advanced** in the top menu bar. In the drop-down list, select **Optional Networking Components**.

6. Select **Other Network File and Print Services** and click **Next**. (If you select **Details** before selecting **Next**, you will see "Print Services for UNIX (R)" as a component of Other Network File and Print Services.) The files being loaded will be shown.
7. Close the Network Connections window. LPR port is now an option in the **Properties** of a printer under **Ports**, **Add Port**.

Configuring a Network LPD Printer

Adding a New LPD Printer

1. Open the **Printers** folder (from the desktop, click **Start**, **Printers and Faxes**).
2. Click **Add Printer**. On the Add Printer Wizard welcome screen, click **Next**.
3. Select **Local printer**, then *uncheck* the automatic detection for Plug and Play printer installation. Click **Next**.
4. Select **Create a new port**, and select **LPR Port** from the pull-down menu. Click **Next**.
5. In the Add LPR Compatible Printer window, do the following:
    a. Type the Domain Name System (DNS) name or Internet protocol (IP) address of the HP Jetdirect print server.
    b. Type (in lowercase) the name of the print queue for the HP Jetdirect print server (for example: `raw`, `text`, `auto`, or `binps`.)
    c. Click **OK**.
6. Select the manufacturer and printer model. (If necessary, click **Have Disk** and follow the instructions to install the printer driver.) Click **Next**.
7. Click **Yes** to keep the existing driver, if prompted. Click **Next**.
8. Type a printer name and (if desired) click this printer as default (if desired). Click **Next**.
9. Select whether to *share* this printer with other network computers (for example, if your system is a printer server). If shared, type a share name to identify the printer to other users. Click **Next**.

10. If desired, enter a location and other information for this printer. Click **Next**.
11. Click **Yes** to print a test page, then click **Next**.
12. Click **Finish** to close the wizard.

Creating an LPR Port for an Installed Printer

1. Click **Start**, **Printers and Faxes**.
2. Right-click the **Printer** icon, and select **Properties**.
3. Select the **Ports** tab and **Add Port**.
4. Select **LPR Port** from the Printer Ports dialog box, and select **New Port**.
5. In the field labeled *Name or address of server providing lpd*, enter the DNS name or IP address of the HP Jetdirect print server.
6. In the dialog box labeled *Name of printer or print queue on that server*, (in lowercase) type the name of the print queue for the HP Jetdirect print server (for example: `raw`, `text`, `auto`, `binps`, or user-specified print queue).
7. Select **OK**.
8. Select **Close** and **OK** to close the **Properties** box.

LPD on Mac OS Systems

LaserWriter 8 version 8.5.1 or higher is required in order to support IP printing on computers running any of the following:

- Mac OS 8.1 or higher
- Mac OS 7.5 through Mac OS 7.6.1
- Desktop Printer Utility 1.0 or later

Note IP printing in LaserWriter 8 is not available on Mac OS 8.0.

Assigning an IP Address

Before you can set up a printer for LPR printing, assign an IP address to the printer or print server. Use the HP LaserJet Utility to configure the printer IP address as follows:

1. Double-click **HP LaserJet Utility** in the HP LaserJet folder.
2. Click the **Settings** button.
3. Select **TCP/IP** from the scrolling list and then click **Edit**.
4. Select the desired option. You can automatically obtain the TCP/IP configuration from either the DHCP server or the BOOTP server, or you can manually specify the TCP/IP configuration.

Setting Up Mac OS

To configure a computer for LPR printing, do the following:

1. Launch the *Desktop Printer Utility*.
2. Select **Printer (LPR)** and click **OK**.
3. In the *PostScript Printer Description (PPD) File* section, click **Change...** and select the PPD for your printer.
4. In the *Internet Printer* or the *LPR Printer* section, depending on your version of the Desktop Printer Utility, click **Change...**.
5. Enter the printer's IP address or domain name for *Printer Address*.
6. Enter the queue name, if used. Otherwise, leave it blank.

Note The queue name is typically `raw`. Other valid queue names are `text`, `binps`, `auto`, or a user-defined queue name (user-defined print queues can be set up through Telnet or the embedded Web server, see Chapter 4).

For a three-port HP Jetdirect external print server, attach a port number to the queue name (for example, `raw1`, `raw2`, or `raw3`).

---

7. Click **Verify** to verify that the printer was found.
8. Click **OK** or **Create**, depending on your version of the Desktop Printer Utility.
9. Go to the **File** menu and select **Save** or use the resulting save dialog, depending on your version of the Desktop Printer Utility.
10. Enter a name and location for the desktop printer icon and click **OK**. The default name is the printer's IP address, and the default location is on the desktop.
11. Exit the program.

For the latest information on using the HP Jetdirect LPD services from Mac OS systems, search for “LPR printing” at Apple Computer's Tech Info Library Web site at http://til.info.apple.com.

6

FTP Printing

Introduction

FTP (File Transfer Protocol) is a basic TCP/IP connectivity utility to transfer data between systems. FTP printing is a way to use FTP to send print files from a client system to an HP Jetdirect-connected printer. In an FTP printing session, the client connects and sends a print file to the HP Jetdirect FTP server which in turn passes the print file to the printer.

The HP Jetdirect FTP server can be enabled or disabled through a configuration tool, such as Telnet (see Chapter 3) or the embedded Web server (see Chapter 4).

Requirements

FTP printing described here requires the following:

- HP Jetdirect print servers with firmware version x.24.01 or later.
- TCP/IP client systems with FTP that complies with RFC 959.

Note For the most recent list of tested systems, visit HP online support at www.hp.com/support/net_printing.

Print Files

The HP Jetdirect FTP server transfers print files to the printer but does not interpret them. For proper printing, print files must be in a language recognized by the printer (such as PostScript, PCL, or unformatted text). For formatted print jobs, you must first print to a file from your application using the driver for the selected printer, then transfer the print file to the printer through an FTP session. For formatted print files, use binary (image) type transfers.

Using FTP Printing

FTP Connections

Similar to standard FTP file transfers, FTP printing uses two TCP connections: a control connection and a data connection.

Once an FTP session is opened, it remains active until either the client closes the connection or the data and control connections are idle for a time that exceeds the idle timeout period (default is 270 seconds). The idle timeout can be set through various TCP/IP configuration tools, such as BOOTP/TFTP, Telnet, printer's control panel (see Chapter 3), the embedded Web server (see Chapter 4), or management software.

Control Connection

Using standard FTP, a control connection is opened by the client to the FTP server on the HP Jetdirect print server. FTP control connections are used to exchange commands between the client and the FTP server. The HP Jetdirect print server supports up to four control connections (or FTP sessions) simultaneously. If the number of allowed connections is exceeded, a message indicating that service is not available will be displayed.

FTP control connections use TCP port 21.

Data Connection

A second connection, a data connection, is created each time a file is transferred between the client and the FTP server. The client controls the creation of a data connection by issuing the commands that require a data connection (such as FTP `ls`, `dir` or `put` commands).

Although the `ls` and `dir` commands are always accepted, the HP Jetdirect FTP server supports a single data connection for printing at a time.

The transmission mode for an FTP data connection with the HP Jetdirect print server is always in stream mode, which marks the end-of-file by closing the data connection.

Once a data connection is established, the file transfer type (ASCII or binary) can be specified. Clients may attempt to autonegotiate a transfer type, and the default transfer type depends on the client system (for example, Windows NT may default to ASCII, while UNIX may default to binary). To specify the transfer type, enter the `bin` or `ascii` command at the FTP prompt.

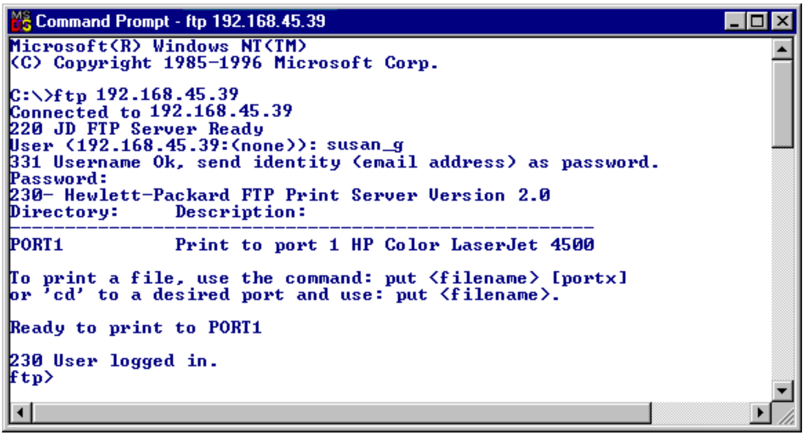
FTP Login

To start an FTP session, enter the following command from a MS-DOS or UNIX command prompt:

```
ftp <IP address>
```

where `<IP address>` is the valid IP address or node name configured for the HP Jetdirect print server. See Figure 6.1

Figure 6.1 FTP Login Example



If the connection is successful, a Ready message will be displayed.

After a successful connection, the user is prompted for a login name and password. The default is the client's login name. The Jetdirect FTP server will allow any user name. Passwords are ignored.

If login is successful, a message "230" will be displayed on the client system. In addition, the available HP Jetdirect ports for printing will be displayed. HP Jetdirect internal print server cards provide a single port (Port 1). HP Jetdirect external print servers with multiple ports will display all available ports, with Port1 the default port. To change ports, use the FTP `cd` (change directory) command. For a typical FTP printing session, see "Example of an FTP Session."

Ending the FTP Session

To end an FTP session, type `quit` or `bye`.

Note Prior to ending an FTP session, a **Ctrl C** command is recommended to ensure the data connection is closed.

Commands

Table 6.1 summarizes commands available to the user during an FTP printing session.

Table 6.1 User Commands for HP Jetdirect FTP Server (1 of 2)

Command	Description
`user <username>`	`<username>` specifies a user. Any user will be accepted and can print to the selected port.
`cd <port#>`	`<port#>` selects a port number for printing. For HP Jetdirect single-port print servers, only port1 is available. For multiport print servers, specify port1 (default), port2, or port3.
`cd /`	/ specifies the root directory of the HP Jetdirect FTP server.
`quit`	`quit` or `bye` terminates the FTP session with the HP Jetdirect print server.
`bye`	
`dir`	`dir` or `ls` displays the contents of the current directory. If this command is typed in the root directory, a list of available ports for printing is displayed. For multiport print servers, the available ports for printing are PORT1 (default), PORT2, and PORT3.
`ls`	
`pwd`	Displays the current directory or the current Jetdirect printing port.
`put <filename>`	`<filename>` specifies the file to send to the selected HP Jetdirect print server port. For multiport print servers, a different port can be specified in the command: `put <filename> <port#>`
`bin`	Configures an FTP binary (image) file transfer.

Table 6.1 User Commands for HP Jetdirect FTP Server (2 of 2)

Command	Description
`ascii`	Configures an FTP ASCII file transfer. HP Jetdirect print servers support only non-print format control for character transfers (standard values for spacing and margins are used).
`Ctrl C`	Press the **Ctrl** and **C** keyboard keys simultaneously to abort the FTP service command and any transfer of data. The data connection is closed.
`rhelp` `remotehelp`	This command depends on your client system (use rhelp on UNIX, or remotehelp on Windows NT/2000) and displays a list of FTP system commands supported by the print server. (Note: The commands displayed are *not* user commands. User-accessible commands depend on the client's FTP system.)

Example of an FTP Session

This is an example of a typical FTP printing session:

```
C:\> ftp 192.168.45.39
Connected to 192.168.45.39.
220 JD FTP Server Ready
User <192.168.45.39:<none>>: susan_g
001 Username Ok, send identity <email address> as password
Password:
230- Hewlett-Packard FTP Print Server Version 2.0
Directory:     Description:
-----------------------------------------------------
PORT1          Print to port 1 HP color LaserJet 4500

To print a file, use the command: put <filename> [portx]
or cd to a desired port and use: put <filename>.

Ready to print to PORT1

230 User logged in.
ftp> pwd
257 "/" is current directory. <"default port is : /PORT1>
HP Color LaserJet 4500"
ftp> cd port1
250 Changed directory to "/PORT1"
ftp> pwd
257 "/PORT1" is current directory. "HP Color LaserJet 4500"
ftp> bin
200 Type set to I. Using binary mode to transfer files.
ftp> put d:\atlas\temp\ftp_test.ps
200 PORT command successful.
150 Opening BINARY mode data connection
226- Ready
226- Processing job
226 Transfer complete
31534 bytes sent in 0.04 seconds <788.35 Kbytes/sec>
ftp> quit
221 Goodbye

C:\>
```

7

Security Features

Introduction

Security features are provided that can help to minimize unauthorized access to network configuration parameters and other data stored on HP Jetdirect print servers. The features may differ depending on the version of firmware resident on the print server.

CAUTION Although these features can help to minimize unauthorized access to stored data and configuration parameters on HP Jetdirect print servers, the prevention of unauthorized access cannot be guaranteed.

For advanced security needs, contact HP Consulting services.

Table 7.1 summarizes the basic security features provided with HP Jetdirect print servers.

Table 7.1 Summary of HP Jetdirect Security Features (1 of 3)

Secure Embedded Web Server Management
(For full-featured print servers only) ● A preinstalled, self-signed digital certificate provides HTTPS (secure HTTP) access to the embedded Web server from your Web browser. HTTPS (secure HTTP) provides secure, encrypted communications with your browser. ● Digital certificates issued by a trusted third party can be installed on the print server, allowing it to be configured as a trusted site. ● Using HTTPS, the embedded Web server provides configuration and management of network parameters and protocols through a secure channel. ● An HP Jetdirect Security Configuration Wizard provides an easy-to-use interface to configure security settings. ● A wireless configuration wizard provides an easy-to-use interface to configure wireless encryption and authentication settings.
Network Protocol Control
● Network printing, printing services, device discovery, and management protocols on the HP Jetdirect print server can be enabled or disabled. By disabling unused or unnecessary protocols, unauthorized access through applications that use these protocols can be prevented. ● Protocols may be enabled or disabled through Telnet, embedded Web server, and HP Web Jetadmin.
IP Administrator Password
● Used by Telnet, HP Web Jetadmin, and the embedded Web server to control access to HP Jetdirect configuration parameters. ● Up to 16 alphanumeric characters may be used. ● Configured on the HP Jetdirect print server using TFTP (Chapter 3), Telnet (Chapter 3), embedded Web server (Chapter 4) services, or HP Web Jetadmin. Up to 16 alphanumeric characters are allowed. ● If configured through the embedded Web server, may be synchronized as the SNMP Set Community Name used in HP Web Jetadmin SNMP v1/v2c Set commands. ● Cleared by cold reset of the print server to factory default settings.

Table 7.1 Summary of HP Jetdirect Security Features (2 of 3)

IP Access Control List
● Specifies up to 10 host systems, or networks of host systems, that are allowed access to the HP Jetdirect print server and the attached network device. ● Access is generally limited to host systems specified in the list. ● By factory default, host systems that use HTTP (for example, using the embedded Web server or IPP) are not checked against entries in the Access List and are allowed access. However, HTTP host access can be disabled through the embedded Web server. ● If the list is empty, then all hosts are allowed access. ● Configured on the HP Jetdirect print server using TFTP (Chapter 3), Telnet (Chapter 3), embedded Web server (Chapter 4), or management software.
Telnet Control
● Telnet may be disabled through the Embedded Web Server (see Chapter 4). Telnet access is not secure.
Authentication and Encryption
(For full-featured print servers only) ● Certificate management for X.509 digital certificates is provided through the embedded Web server, for both client-based and server-based authentication. (Installed certificates are limited to 3KB. A single Certificate Authority (CA) certificate may be installed.) ● For wireless print servers, enhanced authentication and wireless encryption methods are supported. For example, support for 802.1x Extensible Authentication Protocol (EAP) and dynamic encryption protocols, including Wi-Fi Protected Access (WPA) protocol, are supported.

Table 7.1 Summary of HP Jetdirect Security Features (3 of 3)

SNMP v1/v2c Set Community Name (IP/IPX)
(SNMP v1/v2c only) ● A password on the HP Jetdirect print server that allows incoming SNMP Set commands (for example, from management software) to write (or *set*) HP Jetdirect configuration parameters. ● For a user-assigned Set Community Name, SNMP Set commands must contain the user-assigned name, which is authenticated by the print server before the command is performed. ● On IP networks, authentication of SNMP Set commands may be further restricted to systems identified on the access control list. ● Configured on the HP Jetdirect print server using TFTP (Chapter 3), Telnet (Chapter 3), Embedded Web Server (Chapter 4), or Management application services. ● SNMP v1/v2c uses plain text and can be disabled.
SNMP v3
(For full-featured print servers only) ● An SNMP v3 agent on the HP Jetdirect print server provides secure, encrypted communications with an SNMP v3 management application, such as HP Web Jetadmin. ● The print server supports creation of an SNMP v3 account when it is enabled through the embedded Web server. The account information can be integrated on SNMP v3 management applications. ● The print server supports seamless SNMP v3 account creation and management from HP Web Jetadmin.
HP Web Jetadmin Password and Profiles
● Access control to Jetdirect configuration parameters through the Jetdirect IP Administrator password, which may be configured from HP Web Jetadmin, Telnet, or embedded Web server. For instructions, refer to the HP Web Jetadmin online help. ● HP Web Jetadmin provides access control through User Profiles. User Profiles allow password protection for individual profiles and controlled access to HP Jetdirect and printer features. For more information, refer to the HP Web Jetadmin online help. ● (For full-featured print servers only) HP Web Jetadmin can seamlessly enable the SNMP v3 agent on the print server, and create an SNMP v3 account for secure, encrypted management.
Printer Control Panel Lock
● Selected HP printers provide a control panel lock that prevents access to HP Jetdirect internal print server configuration parameters. In many cases, this lock may be set remotely by management applications (such as HP Web Jetadmin). To determine whether your printer supports a control panel lock, refer to your printer documentation.

Using Security Features

Access to HP Jetdirect configuration parameters can be controlled through combined use of the available security features. Table 7.2 provides examples of various settings and the associated level of access control.

Table 7.2 Settings for Access Control

Settings	Level of Access Control
● Accessible through HTTP (embedded Web server), SNMP v1/v2c applications, or Telnet ● Administrator password not set ● Default SNMP v1/v2c community names used ● No authentication or encryption ● Access control list empty	**Low** Best suited for trusted environments. Any system can access the HP Jetdirect configuration parameters through the Embedded Web Server, Telnet, or SNMP management software. Passwords are not required.
● Administrator password set ● User-specified SNMP v1/v2 Set Community Name set ● The Access Control List contains host entries and checks HTTP connections ● Telnet and other non-secure protocols disabled.	**Medium** Limited security for non-trusted environment. If the Administrator password and SNMP v1/v2c Set Community Name are known, access is limited to: ● systems listed in the Access Control List, and ● SNMP v1/v2c management applications

Table 7.2 Settings for Access Control

Settings	Level of Access Control
• Unused protocols disabled • HTTPS access enabled using certificates issued by trusted sources • Wireless Jetdirect print servers configured for 802.1x EAP authentication that use dynamic encryption • SNMP v3 enabled, SNMP v1/v2c disabled • Telnet disabled • Passwords set • The Access Control List contains specified entries and HTTP connections are checked • Printer control panel locked	**High** High security for non-trusted, professionally managed environments. Access is limited to authenticated hosts that are specified in the Access Control List. Encryption provides data privacy; network communication in plain-text is not used. **CAUTION**: Power-on settings (for example, configurations from a BootP/TFTP or DHCP/TFTP server) may change the print server's settings when it is power-cycled. Be sure to confirm your intended power-on settings.

8

Troubleshooting the HP Jetdirect Print Server

Introduction

This chapter describes how to diagnose and correct problems associated with the HP Jetdirect print server.

A flowchart guides you to the correct procedures for troubleshooting the following:

- Printer problems
- HP Jetdirect hardware installation and connection problems
- Network-related problems

To troubleshoot your HP Jetdirect print server, you may need the following items:

- A Jetdirect configuration page (see Chapter 9)
- A Printer Configuration or Diagnostic Page
- Documentation that came with your printer
- Documentation that came with your HP Jetdirect print server
- The diagnostics tools and utilities provided with your network software (for example, Novell NetWare utilities, TCP/IP utilities, or network printer management applications such as HP Web Jetadmin)

Note Frequently asked questions about installing and configuring HP Jetdirect print servers can be found by searching for your HP Jetdirect product at http://www.hp.com/support/net_printing.

Resetting to Factory Defaults

Parameters on the HP Jetdirect print server (for example, the IP address) can be reset to factory default values using the following procedures:

CAUTION For HP Jetdirect wireless print servers, resetting to factory default settings may cause the print server to lose its wireless connection to your network. Reconfiguration of wireless network settings and reinstallation of the print server may be required.

A Jetdirect X.509 certificate, installed for SSL/TLS secure Web services, will be saved over a cold reset to factory default values. However, a Certificate Authority (CA) certificate installed to validate a network authentication server will not be saved.

- **HP LaserJet Printer with Internal EIO Print Server**

  In most cases, the HP Jetdirect internal print server can be reset to factory defaults when a cold-reset is performed on the printer. For selected HP LaserJet printers, a cold-reset is performed by power cycling the printer while pressing the **Go** button. For other printers, refer to your printer manuals. Or, visit http://www.hp.com/go/support and search for document file bpj02300.html.

Note Some printers provide a factory reset option for the printer through the printer's control panel. However, this reset option for the printer may not reset the HP Jetdirect print server. When you attempt to reset to factory default values, print a Jetdirect configuration page to confirm that factory-reset values have been assigned.

CAUTION Resetting the printer will reset **all** printer settings to their factory defaults. After resetting the printer, you may need to use the printer's control panel to reconfigure printer settings that are required by users.

- **HP Jetdirect Internal LIO Print Servers**

  Reset HP Jetdirect LIO print servers by holding down the Test button on the print server while inserting the print server into the LIO slot. Because the LIO print server receives its power from the printer, the printer must be turned on.

- **HP Jetdirect External Print Servers**

  Reset the HP Jetdirect external print server by holding down the **Test** button on the print server while connecting the power cord.

After a cold reset, your network systems may lose their connection to the printer.

General Troubleshooting

Troubleshooting Chart - Assessing the Problem

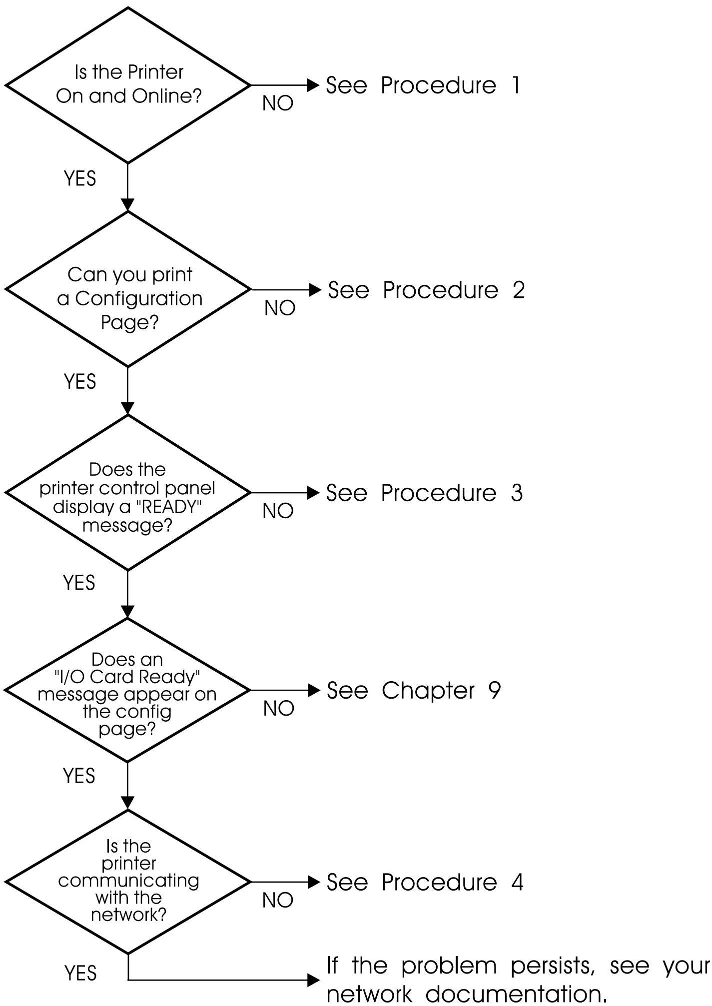


Figure 8.1 Assessing the Problem

Procedure 1: Verifying that the Printer is On and Online

Check the following items to make sure the printer is ready to print.

1. Is the printer plugged in and turned on?

   Make sure the printer is plugged in and turned on. If the problem persists, you may have a defective power cable, power source, or printer.

2. Is the printer online?

   The online light should be lit. If it is not, press the appropriate key (for example, **On Line** or **Go**) to place the printer online.

3. Is the printer's control panel display blank (on printers with displays)?

   - Make sure the printer is turned on.
   - Make sure the HP Jetdirect print server is installed correctly.

4. Is the form feed light on (where applicable)?

   If the form feed light is on, it may indicate that a Form Feed was not sent with the print data, and that data is waiting for a Form Feed to print. Take the printer offline, press **Form Feed**, then put the printer back online.

5. Does a message other than READY appear on the printer control panel display?

   - See Procedure 3 in this section for a list of network-related error messages and corrective actions.
   - See your printer documentation for a complete list of control panel messages and corrective actions.

Procedure 2: Printing an HP Jetdirect Configuration Page

The HP Jetdirect configuration page is an important troubleshooting tool. The information on this page reveals the status of your network and the HP Jetdirect print server. The ability to print a configuration page provides an indication that the printer is operating correctly. See Chapter 9 for information on the HP Jetdirect configuration page.

Note For a TCP/IP network, the Jetdirect configuration page can also be viewed from a browser by accessing the Jetdirect embedded Web server. See Chapter 4 for more information.

Check the following items if the configuration page does not print.

1. Did you perform the correct steps on the printer to print the configuration page?

   The steps required to print a configuration page vary between different printers. See your printer manual or the hardware installation guide for your HP Jetdirect print server for specific instructions on how to print a configuration page.

2. Is there a print job in process?

   You cannot print an HP Jetdirect configuration page to the printer while a print job is in process. Wait until the print job is complete, then print the configuration page.

3. Does an error message appear on the printer control panel display?

   - See Procedure 3 in this section for a list of network-related error messages and corrective actions.
   - See your printer documentation for a complete list of control panel messages and corrective actions.

Procedure 3: Resolving Printer Display Error Messages

Check the following information to resolve network-related error messages that appear on the printer control panel display. *This information assumes you have already printed a configuration page.*

1. Does the printer's control panel display messages similar to the following?

   `EIO X  NOT FUNCTIONAL`

   `8X.YYYY EIO ERROR`

   (where `X` is the EIO slot number and `YYYY` is an error code)

   - Refer to your printer manuals to interpret the error message.
   - If you upgraded the Jetdirect firmware recently, power the print server off/on. For internal Jetdirect cards, turn the printer off and back on again.
   - Reinstall the HP Jetdirect print server to ensure it is installed correctly, and verify all connectors are fully mated.
   - If possible, print an HP Jetdirect configuration page and verify all configuration parameters. To interpret HP Jetdirect configuration page messages, see Chapter 9.
   - If your printer contains multiple EIO slots, try using a different slot.
   - Turn off the printer, remove the HP Jetdirect print server, and turn the printer back on. If the error message disappears when the print server is removed, it is likely that the print server was causing the error. Replace the print server.
   - Record all error codes and contact your service provider. If you need to replace the HP Jetdirect print server under warranty service, include all diagnostic and configuration pages with the faulty print server.

2. Does `EIOX INITIALIZING/DO NOT POWER OFF` appear on the display?

   Wait for ten minutes to see if it clears. If it does not, you may need to replace the HP Jetdirect print server.

3. Does a 40 ERROR appear on the printer's control panel display?

   The HP Jetdirect print server detected a break in the data communications. When this error occurs, the printer goes offline.

   A break in communications may result from the physical network connection being disrupted or the server going down. If your printer has an Auto Continue feature that is disabled or off, you must press the appropriate key (**Continue** or **Go**, for example) on the printer after the communications problem is solved to put the printer back online. Turning the Auto Continue feature on forces the printer to reconnect without user intervention. However, this does not solve the disconnect problem.

4. Does an initializing (INIT) message appear on the display?

   This is a normal message. Wait about 3 minutes for the message to clear, or another message to appear. If another message appears, see the printer's documentation and configuration pages for additional information.

5. Does a message other than READY or the messages listed in this section appear on the display?

   See your printer documentation for a complete list of control panel messages and corrective actions.

Procedure 4: Resolving Printer Communication Problems with the Network

Check the following items to verify that the printer is communicating with the network. *This information assumes you have already printed a Jetdirect configuration page.*

1. Are there any physical connection problems between the workstation or file server and the HP Jetdirect print server?

   Verify network cabling, connections, and router configurations. Verify that network cable lengths meet network specifications. Verify that wireless network settings have been properly configured.

2. Are your network cables connected properly?

   Make sure that the printer is attached to the network using the appropriate HP Jetdirect print server port and cable. Check each cable connection to make sure it is secure and in the right place. If the problem continues, try a different cable or ports on the hub or transceiver.

3. For 10/100Base-TX print servers, is autonegotiation turned off?

   The speed and communication mode on the print server must match the network for proper operation. Autonegotiation is configured through the EIO menu from the printer's control panel.

4. Have any software applications been added to the network?

   Make sure they are compatible and that they are installed correctly with the correct printer drivers.

5. Are other users able to print?

   The problem may be workstation-specific. Check the workstation network drivers, printer drivers, and redirection (capture in Novell NetWare).

6. If other users are able to print, are they using the same network operating system?

   Check your system for proper network operating system setup.

7. Is your protocol enabled on the HP Jetdirect print server?

   Check the status of your protocol on the Jetdirect configuration page. See Chapter 9 for information on the configuration page. (On TCP/IP networks, you can also use the embedded Web server to check status of other protocols. See Chapter 4.)

8. Is there an error message in the protocol's section on the Jetdirect configuration page?

   See Chapter 9 "HP Jetdirect Configuration Page" for a list of error messages.

9. If you are using Token Ring, is the data rate correct?

   Check the Jetdirect configuration page for the current settings. If they are incorrect, refer to the Token Ring settings in the print server hardware installation guide.

10. If you are using Apple EtherTalk, does the printer appear in the Chooser?

    - Verify network and HP Jetdirect settings on the Jetdirect configuration page. See Chapter 9 for information on the configuration page.
    - Confirm the network settings for the printer using the printer control panel (for printers with control panels).
    - See the troubleshooting section in the online help for the HP LaserJet Utility.
    - Verify the printer has the PostScript option installed.

11. If you are on a TCP/IP network, can you use Telnet to print directly to the printer?

    Use the following Telnet command:

    ```
    telnet <IP address> <port>
    ```

    where <IP address> is the IP address assigned to the HP Jetdirect print server and <port> is 9100. (HP Jetdirect data port 9101 or 9102 can also be used for ports 2 or 3 respectively, of a Jetdirect multiport external print server.)

    In the Telnet session, type in data and press **Enter**. The data should print to the printer (a manual form feed may be required).

12. Does the printer appear in HP Web Jetadmin or other management application?
    - Verify network and HP Jetdirect settings on the Jetdirect configuration page. See Chapter 9 for information on the configuration page.
    - Confirm the network settings for the printer using the printer control panel (for printers with control panels).
    - See the troubleshooting section in the online help included with the HP Web Jetadmin software.
13. If you are using Microsoft Windows NT 4.0 (DLC/LLC), does the printer appear in the *Add a Hewlett-Packard Network Peripheral Port* dialog box?
    - Verify network and HP Jetdirect settings on the Jetdirect configuration page. See Chapter 9 for information on the configuration page.
    - Confirm the network settings for the printer using the printer control panel (for printers with control panels).
    - Ensure that the printer is on the same physical subnet and that it is not connected over a router.
14. On supported systems, does the printer respond to HP Web Jetadmin?
    - Verify network and HP Jetdirect settings on the Jetdirect configuration page. See Chapter 9 for information on the configuration page.
    - Confirm the network settings for the printer using the printer control panel (for printers with control panels).
    - See the troubleshooting section in the online help included with the HP Web Jetadmin software.

Troubleshooting Wireless Print Servers

Unable to Communicate During Initial Setup

Verify the following:

- Your wireless computer is configured to match the default wireless network settings on the HP Jetdirect print server:
  - Communication Mode: Ad Hoc
  - Network Name (SSID): hpsetup
  - Encryption (WEP): <Disabled>

Note The Network Name (SSID) is case-sensitive. Be sure to specify "hpsetup" using lowercase characters.

- The HP Jetdirect print server is turned on and operating properly (print a Jetdirect configuration page).
- You are within range of the HP Jetdirect print server.
- There are fewer than six devices total on the Ad Hoc network (with SSID "hpsetup").
- There is no Access Point in the vicinity that is configured with an SSID of "hpsetup".
- Multiple print servers are not being configured at the same time. If there are multiple print servers, turn all off except the one you want to configure.

Unable to Communicate After Initial Setup

If you have successfully configured the HP Jetdirect wireless print server with a network connection to your network, but your network computers are unable to communicate with the printer (including a “ping” command), try the following:

- Print a Jetdirect configuration page and verify all configuration settings for your network. Common errors include incorrect entries for the following items:
  - Communication Mode (Ad Hoc or Infrastructure)
  - Network Name (SSID), which is case-sensitive
  - Authentication method
  - Encryption level, encryption key entries, or the specified transmit key
  - IP address
  - BSSID (Basic Service Set Identifier), which distinguishes one wireless LAN from another even though they have the same SSID.
- Verify that the printer is within range of the network. See “Improving Reception and Performance” in this chapter.
- Use a wireless PC and its utilities to confirm the signal strength at the printer’s location. The detected signal strength should be similar for the print server, as indicated on the HP Jetdirect configuration page.

My Configured Channel Does Not Match the Configuration Page

(Ad Hoc mode only) The HP configuration tools allow you to select channel 10 (default) or 11 on the HP Jetdirect wireless print server. This channel is only used by the print server to broadcast its Network Name (SSID) if it fails to detect and join an existing wireless network. If it is able to join a network, it will reconfigure its channel to the one used by the network.

The Jetdirect configuration page will identify the network channel actually being used on a network. It does not show the broadcast channel used when a network is not detected.

Unable to Use the HP Jetdirect Wireless Setup Wizard

The HP Jetdirect Wireless Setup Wizard (Windows) is used to configure the HP Jetdirect wireless print server with wireless network connection settings to access your network.

If you are unable to use this wizard, refer to other options described in the *HP Jetdirect Administrator's Guide* for this print server model, supplied on the HP Jetdirect CD-ROM. Other tools available include:

- the embedded Web server (see Chapter 4 and Appendix B)
- Telnet (see Chapter 3)
- printer's control panel for selected printers (see Appendix C)

Note The configurable parameters available through these optional tools may be limited.

Improving Reception and Performance

Wireless LAN radio signals can penetrate many indoor structures and can reflect around obstacles. However, wireless communication range and performance depends on a variety of factors, including the number of users, the quality and physical placement of the wireless hardware, and the sources of radio signal interference (for example, microwave ovens and cordless telephones use similar frequencies that may interfere with wireless LAN signals). In general, the HP Jetdirect wireless print server's data transfer rates will decrease with increasing distance, obstructions and interference.

Symptoms

- Wireless status LED is yellow.
- The signal strength (see the HP Jetdirect configuration page or embedded Web server) is poor or marginal.
- Print jobs are excessively slow.

Corrective Actions

- Re-orient the printer or HP Jetdirect wireless print server. In general, having the print server pointed toward the Access Point or wireless PC will improve reception and performance.
- Reduce or remove sources of interference. Metallic objects can absorb or attenuate radio signals, and devices such as microwave ovens and cordless phones operate using similar radio frequencies.
- Reduce the distance between the printer and the Access Point or wireless PC. This can be accomplished by:
  - moving the printer
  - moving the Access Point or wireless PC
  - adding an additional Access Point (Infrastructure mode only)
- Elevate the Access Point's antenna. In most office environments, elevating the Access Point's antenna will improve the range and performance of all wireless devices.
- Add an external antenna to the HP Jetdirect wireless print server (if it supports one). In most office environments, elevating the print server's external antenna will improve its range and performance.

Firmware Download Failure

HP Jetdirect wireless print servers support network installation, or download, of firmware upgrades to provide new or enhanced features. As with other HP Jetdirect print servers, firmware upgrades may be downloaded using tools such as HP Download Manager (Windows), HP Web Jetadmin, or FTP (File Transfer Protocol).

- If the firmware download fails to complete, you should **restart the download without cycling power** to the print server.
- If power is lost during the download and the print server must be restarted, your next steps depend on whether the print server is configured for server-based authentication.

If Server-Based Authentication Is Not Used

If a firmware download failure occurs on an HP Jetdirect wireless print server that is not configured for server-based authentication, simply restart the download process and try again. If it is powered off/on, the print server will regain its previous configuration prior to the download failure.

If Server-based Authentication Is Used

CAUTION If possible, do not power off/on or re-initialize the print server. Simply restart the download process and try again. When powered off/on, the print server will lose its authentication parameter settings and will not be able to access the network.

If the print server is powered off/on or re-initialized, see the procedures below.

HP Jetdirect wireless print servers support 802.1x EAP authentication methods.

If the print server is powered off/on and loses its wireless network connection, follow these steps:

1. Install a download utility (such as HP Download Manager, or HP Web Jetadmin) on a supported wireless computer.
2. Copy the firmware upgrade files onto the wireless computer.

3. Configure the wireless network settings on the computer to match the default settings on the HP Jetdirect wireless print server:
   - Communication Mode: Ad Hoc
   - Network Name (SSID): hpsetup
   - Encryption (WEP): <disabled or turned off>

Note Due to the state of the HP Jetdirect wireless print server after a failed download and powered off/on, the HP Wireless Setup wizard cannot be used to configure the print server.

4. On the wireless computer, create an IP path to the default IP address on the HP Jetdirect wireless print server. For example, if the default address is 192.0.0.192, use one of the following methods:
   - Use a "route add" command from your system prompt, or
   - Reconfigure the computer's IP address to match the default IP network of the Jetdirect print server (for example, use 192.0.0.193).
5. Run the HP download utility and complete the firmware download.
6. After the firmware download completes successfully, restart the print server. The configuration settings prior to the firmware download failure will be restored.

Troubleshooting an LPD UNIX Configuration

Note For HP Jetdirect wireless print servers, this section assumes that a wireless connection to your network has been established.

The troubleshooting steps below describe how to troubleshoot printing problems you may have with the HP Jetdirect print server.

1. Print a Jetdirect configuration page.
2. Verify that the IP configuration values are correct. If they are not, reconfigure the HP Jetdirect print server.
3. Log onto the host system and type:

   `ping <IP address>`

   where `<IP address>` is the IP Address assigned to the printer.
4. If ping fails, make sure the IP Address on the configuration page is correct. If it is correct, the problem is in the network.
5. If the ping test passes, print a test file. At the UNIX prompt, type:

   `lpr -Pprinter_name test_file` (BSD-based and Linux systems)

   where `printer_name` is the name of your printer and `test_file` is an appropriate file (ASCII, PCL, PostScript, HP-GL/2, or text) for the printer defined in the `:rp` tag in the printcap file.
6. If the test file does not print, do the following:
   - Check printcap entries.
   - Check printer status (using LPC or a similar process).
   - Examine the contents of the logfile for this printer, such as `/usr/spool/lpd/error_log_filename`
   - Check other log files, such as HP-UX: `/usr/adm/syslog`

7. If the test file prints but is formatted incorrectly, do the following:

   - Check :rp tag in printcap file.
     Example 1 (suggested name for an ASCII or text printer):

     ```
     text | lj1_text:\
     :lp=:\
     :rm=laserjet1:\
     :rp=text:\
     :lf=/usr/spool/lpd/ERRORLOG:\
     :sd=/usr/spool/lpd/lj1_text:
     ```

     Example 2 (suggested name for PostScript, PCL, or HP-GL/2 printers):

     ```
     raw | lj1_raw:\
     :lp=:\
     :rm=laserjet:\
     :rp=raw:\
     :lf=/usr/spool/lpd/ERRORLOG:\
     :sd=/usr/spool/lpd/lj1_raw:
     ```

8. Check that the printer is set up to print the type of test file you specified: PCL, PostScript, HP-GL/2, or ASCII.

9. Check whether the printer was turned off or lost its LAN connection in the middle of a print job. LPD queues may become disabled or stop sending data if the printer is powered off or if the LAN connection is broken when the printer is in the middle of printing a job. (Example: power is turned off to fix a paper jam.)

   Use the HP-UX command `lpstat -Pqname` to find out if the queue has been disabled after the printer has powered up again or the connection is reestablished.

   The disabled queue can be restarted using the following command:

   HP-UX: `enable qname`

9

HP Jetdirect Configuration Page

Introduction

The HP Jetdirect configuration page is an important tool for managing or troubleshooting HP Jetdirect print servers. This page provides identification information (such as the HP Jetdirect model, firmware version, and LAN hardware address), as well as status and configuration parameters of supported network protocols. Network statistics gathered by the print server are also provided.

The HP Jetdirect configuration page may be printed directly on the attached printer. The format of the Jetdirect configuration page depends on:

- the printer model
- the HP Jetdirect model and firmware version

For HP Enhanced I/O (EIO) printers with an HP Jetdirect EIO print server installed, a Jetdirect configuration page will automatically print after a printer configuration page is printed. For instructions, see your printer manuals.

An HP Jetdirect configuration page can also be viewed over the network from a management utility (such as HP Web Jetadmin), or by accessing the embedded Web server on the HP Jetdirect print server (see Chapter 4).

Status Field Error Messages

The HP Jetdirect configuration page contains several status fields for the print server and the supported protocols. One or more error codes and related error messages may be displayed in a Status field. For information on each error message, see Table 9.12.

Configuration Page Format

A typical Jetdirect configuration page is illustrated in Figure 9.1. The configuration page information provided will vary depending on the print server.

Figure 9.1 Typical Jetdirect Configuration Page

HP LaserJet *4050 series printers* HEWLETT PACKARD

EIO 2 - JetDirect Page 1

```
----- HP JetDirect Configuration -------
Status:                     I/O Card Ready

Model Number:                       J4169A
Hardware Address:             0001E63AA043
Firmware Version:                  GAC18LU
Port Config:                  10BASE-T HALF
Auto Negotiation:                       On
Manufacturing ID:           21214114202121G
Date Manufactured:                 04/2001

---------- Security Settings -----------
Admin Password:              Not Specified
SSL/TLS:                          Disabled
Cert Expires:               Not Applicable
SNMP Versions:                         1,2
SNMP Set Cmty Name:          Not Specified
Access List:                 Not Specified

--------- Network Statistics -----------
Total Packets Received:                 39
Unicast Packets Received:                4
Bad Packets Received:                    0
Framing Errors Received:                 0
Total Packets Transmitted:              38
Unsendable Packets:                      0
Transmit Collisions:                     0
Transmit Late Collisions:                0

-------------- TCP/IP ----------------
Status:                              Ready

Host Name:                        NPI3AA043
IP Address:                   192.168.2.116
Subnet Mask:                  255.255.255.0
Default Gateway:                192.168.2.1
Config By:                            BOOTP
BOOTP Server:                   192.168.2.2
TFTP Server:                  Not Specified
Config File:                  Not Specified
Domain Name:                   cellar.hp.com
DNS Server:                     192.168.2.4
WINS Server:                  Not Specified
Syslog Server:                Not Specified
Idle Timeout:                       270 sec
Web JetAdmin URL:             Not Specified
```

```
-------------- IPX/SPX ----------------
Status:                              Ready

Primary Frame Type:            Auto Select

Network  Frame Type                   Rcvd
Unknown  EN_802.2                       10

----------- Novell/NetWare -------------
Status:                                 16
  NOT CONFIGURED
Node Name:                       NPI3AA043

NetWare Mode:                 Queue Server
NDS Tree Name:

NDS Context:

Attached Server:

SAP Interval:                       60 sec

------------- AppleTalk ---------------
Status:                       Initializing

Name:
Zone:                                    *
Type 1:                        HP LaserJet
Type 2:                        LaserWriter
Network Number:                      65281
Node Number:                             7

-------------- DLC/LLC ----------------
Status:                              Ready
```

The Jetdirect configuration page is divided into sections, as identified in the following table. For each section, the detailed parameter descriptions and settings, including error messages, are provided in the remainder of this chapter.

Section Name	Description
HP Jetdirect Configuration or General Information	Identifies the HP Jetdirect print server and provides general status. For information on items in this section, see Table 9.1. (For error messages, see Table 9.12.)
USB Printer Information	(HP Jetdirect external print servers only) Provides current status of the USB connection to the printer. See Table 9.2. (For error messages, see Table 9.12.)
802.11b Wireless	(HP Jetdirect wireless print servers only) Provides current status of the wireless connection, and identifies the current wireless network parameters configured. See Table 9.3. Error messages are also included in the table.)
Security Settings	Provides the current status of configuration and access security parameters. See Table 9.4.
Network Statistics	(HP Jetdirect wired print servers only) Provides the current values for various network parameters monitored by the HP Jetdirect print server. See Table 9.5.
TCP/IP	Provides the current status and parameter values for the TCP/IP network protocols. See Table 9.6. (For error messages, see Table 9.12.)
IPX/SPX	Provides the current status and parameter values for the IPX/SPX network protocols. See Table 9.7. (For error messages, see Table 9.12.)
Novell/NetWare	Provides the current status and parameter values for a Novell NetWare network. See Table 9.8. (For error messages, see Table 9.12.)
AppleTalk	(Ethernet Only) Provides the current status and parameter values for the AppleTalk network protocols. See Table 9.9. (For error messages, see Table 9.12.)
DLC/LLC	Provides the current status and parameter values for the DLC/LLC network protocols. See Table 9.10. (For error messages, see Table 9.12.)
Token Ring Diagnostics	(Token Ring Only) Provides additional diagnostic status detected by Token Ring print servers. See Table 9.11. (For error messages, see Table 9.12.)

Configuration Page Messages

HP Jetdirect Configuration/General Information

Information in this section provides general HP Jetdirect print server configuration as described in Table 9.1. For error messages, see Table 9.12.

Table 9.1 HP Jetdirect Configuration (1 of 2)

Message	Description
STATUS:	Current state of the HP Jetdirect print server. I/O CARD READY: The HP Jetdirect print server has successfully connected to the network and is awaiting data. I/O CARD INITIALIZING: The HP Jetdirect print server is initializing the network protocols. For more information, see the status line for each protocol on the configuration page. I/O CARD NOT READY: There is a problem with the print server or its configuration. An error code and message is displayed if the print server is not ready. For more information, see Table 9.12.
MODEL NUMBER:	The model number of the HP Jetdirect print server (for example, J6057A)
HARDWARE ADDRESS:	The 12-digit hexadecimal network hardware (MAC) address of the HP Jetdirect print server installed in the printer or device. This address is assigned by the manufacturer.
FIRMWARE VERSION:	The firmware revision number of the HP Jetdirect print server currently installed in the printer. The format is X.NN.NN, where X is a letter that depends on the HP Jetdirect print server model.
PORT SELECT:	(Ethernet only) Specifies the port on the HP Jetdirect print server that has been detected for use: NONE: The print server is not connected to the network. RJ-45: The RJ-45 network port is connected.
DATA RATE:	Specifies the Token Ring data rate configured on the HP Jetdirect print server: 4 Mbps or 16 Mbps. The setting must match the data rate of the network. The data rate is configured through a switch on the print server. See your print server's hardware installation guide.
LAA	The Locally Administered Address (LAA) identifies the user-specified LAN hardware address of a print server, which may be required by some network adiministrators. The default address is the print server's factory-default LAN hardware address.

Table 9.1 HP Jetdirect Configuration (2 of 2)

Message	Description
PORT CONFIG:	Identifies the link configuration of the RJ-45 port on the HP Jetdirect 10/100Base-TX print server: 10BASE-T HALF: 10 Mbps, half-duplex 10BASE-T FULL: 10 Mbps, full-duplex 100TX HALF: 100Mbps, half-duplex 100TX-FULL: 100Mbps, full-duplex UNKNOWN: The print server is in an initialization state. DISCONNECTED: A network connection has not been detected. Check network cables.
AUTONEGOTIATION	Identifies whether IEEE 802.3u Autonegotiation on the HP Jetdirect 10/100TX port is enabled (ON) or disabled (OFF). ON (default): The HP Jetdirect print server will attempt to automatically configure itself onto the network at the proper speed (10 or 100 Mbps) and mode (half or full duplex). Autonegotiation is enabled after a cold reset. OFF: You must manually configure the speed and mode using the EIO menu from the printer's control panel. If Autonegotiation is off, the settings must match those of the network for proper operation.
MANUFACTURING ID:	The manufacturing identification code for use by HP online support personnel.
DATE MANUFACTURED:	Identifies the date of manufacture of the HP Jetdirect print server.
Total Packets Transmitted	(HP Jetdirect 802.11b wireless print servers) Total number of frames (packets) transmitted without error.
Total Packets Received	(HP Jetdirect 802.11b wireless print servers) Total number of frames (packets) received by the HP Jetdirect print server without error. This includes broadcast, multicast packets, and packets specifically addressed to the print server. This number does not include packets specifically addressed to other nodes.

USB Printer Settings

This section applies to HP Jetdirect external print servers with USB printer connections only. USB information on the HP Jetdirect configuration page is described in Table 9.2. For non-HP devices, some information may not be available.

Table 9.2 USB Settings

Message	Description
Device Name	Name of the attached USB printing device, supplied by the manufacturer.
Manufacturer	Manufacturer of the attached printing device.
Serial Number	The Manufacturer's serial number for the attached printing device.
Communication Mode	Current USB communication mode: ● 1284.4: IEEE standard protocol, a mode for printers and multi-function (All-in-One) devices that allows multiple channels of simultaneous print, scan, and status communication. ● MLC: HP-proprietary protocol for Multiple Logical Channels, a mode for printers and multi-function (All-in-One) devices that allows multiple channels of simultaneous print, scan, and status communication. ● Bidirectional: Two-way printer communication, sending print data to the printing device and returning status information from the printing device. ● Unidirectional: One-way communication to the printing device. ● Device not found: The connection of a printing device has not been detected. Check device and cable. ● Device not supported: The device connected is not a printer (for example, a camera).
USB SPEED	(USB 2.0 print servers only) Specifies the autonegotiated communication speed over the USB connection between the print server and the device. Full Speed: 12 Mbits/sec as specified in the USB v2.0 specifications, compatible with USB v1.1 specifications. Hi-Speed: 480 Mbits/sec for USB v2.0 devices only. Disconnected: The USB port is not connected.

802.11b Wireless Settings

Wireless status, configuration parameters and error messages are listed in Table 9.3.

Table 9.3 802.11b Wireless Settings (1 of 3)

Message	Description
Status	Current 802.11b wireless configuration status. Ready: A wireless connection to the network has been established. ● Infrastructure Mode: Associated with an Access Point and authenticated on the network. ● Ad Hoc Mode: Wireless communications established directly with other network devices (Access Points are not used in Ad Hoc Mode). Initializing: The print server is booting up, performing self-tests, and verifying internal communications. Scanning: The print server is scanning for the specified network. Status or error messages that may also be displayed are listed below. ● Infrastructure Mode: The print server is scanning on all channels for a network (Access Point) with the specified SSID. ● Ad Hoc Mode: The print server is scanning on all channels for a network with the specified SSID, or has created a workgroup to which no one has joined. Error: A wireless connection error has occurred that prevents association or authentication with an Access Point (Infrastructure Mode), or prevents a connection to an Ad Hoc network. Status or error messages that may also be displayed are listed below. **Status/Error Messages** ● NO SIGNAL DETECTED: (Infrastructure Mode only) The print server did not find an Access Point and did not detect a radio signal. ● SCANNING FOR SSID: The print server is scanning on all channels for devices on the specified SSID. Check your specified SSID, or check status of the Access Point (Infrastructure mode) or other wireless devices. The print server will continue to scan for the specified SSID.

Table 9.3 802.11b Wireless Settings (2 of 3)

Message	Description
	● AUTHENTICATION IN PROGRESS: Link-level authentication is in progress. In Infrastructure mode, server-based authentication may also be in progress. ● AUTHENTICATION FAILED. The Jetdirect print server could not access the network because of an authentication error. The error depends on the authentication method used. Verify the authentication method using the “Authentication Type” field. ● ENCRYPTION REQUIRED: Encryption is required on this network, but encryption has not been enabled on the Jetdirect print server. Verify encryption configuration.
Communication Mode	Specifies the wireless network topology configured on the Jetdirect print server: Infrastructure: Wireless connection to an Access Point (gateway, bridge, Base Station) that receives and forwards network traffic between all network nodes. Ad Hoc: A direct wireless peer-to-peer connection to all network nodes, without routing through an Access Point.
Network Name (SSID)	Identifies the name of the network (Service Set Identifier) to which the print server has connected.
Signal Strength (1-5)	The strength of the radio signal received by the print server. The following items may be displayed: 1, 2, 3, 4, 5: Indicates the signal strength. Level 1(Poor), Levels 2 and 3 (Marginal), Level 4 (Good), Level 5 (Excellent) No Signal: No radio signal detected on any channel. <blank>: No radio signal detected while the print server is scanning. Not Applicable: Signal strength is not applicable when the print server is in Ad Hoc mode.
Access Point / BSSID	Basic Service Set Identifier (BSSID) is a 6-byte number that distinguishes one wireless LAN (WLAN) from another, even if they have the same Network Name (SSID). Infrastructure Mode: The MAC address or name of the Access Point to which the Jetdirect wireless print server is connected. Ad Hoc Mode: A random number or name generated by the initiator of the Ad Hoc network.

Table 9.3 802.11b Wireless Settings (3 of 3)

Message	Description
Channel	Specifies the radio frequency channel that the print server sensed and configured for communication on the network. Because it was automatically sensed from the network, this channel may differ from the user-configured channel (which is only used for broadcasts if the specified network/SSID is not found). Channel number values 1 through14 may be displayed. The allowed channels are country/region-dependent.
Authentication Type	Identifies the authentication method configured on the Jetdirect print server. It must match the method used on the network to which the print server will connect. Open System: Positive validation of a device’s identification is not required for network access unless the network requires EAP authentication. An authentication failure may indicate that an EAP authentication server has rejected network access. Shared Key: Each device on the network must be configured with a shared secret WEP key to gain access to the network. Authentication failures for the Jetdirect print server may arise if the installed key is faulty, or the wrong key is active (when multiple keys are configured and stored on the print server). EAP: (Infrastructure mode only) IEEE 802.1x Extensible Authentication Protocol (EAP) uses network authentication servers for client access. HP Jetdirect EAP support includes LEAP, PEAP, EAP-MD5, EAP-TLS, and EAP-TTLS authentication protocols. An authentication failure may indicate that the EAP authentication server has rejected the print server’s authentication requests. PSK: When an authentication server is not available on a network, Extensible Authentication Protocol (EAP) is used for authentication through a Pre-shared key. The Pre-shared key is generated by the print server through a user-specified network pass-phrase configured on the print server.
Encryption Type	Specifies the level of encryption configured on the Jetdirect print server. 64-bit WEP: A user-specified static 40/64-bit WEP encryption key has been configured using 5 alphanumeric ASCII characters or 10 hexadecimal digits. 128-bit WEP: A user-specified static 104/128-bit WEP encryption key has been configured using 13 alphanumeric ASCII characters or 26 hexadecimal digits. Dynamic (WEP/WPA): Dynamic encryption is being used with WEP, WPA, or both. None: Encryption keys have not been configured.

Security Settings

Information in this section of the Jetdirect configuration page is described in Table 9.4.

Table 9.4 Security Settings (1 of 2)

Message	Description
Admin Password:	Specifies whether an IP Administrator password has been configured on the print server. This password is shared by Telnet, the embedded Web server, and HP Web Jetadmin to control access to print server configuration parameters. Up to 16 case-sensitive, alphanumeric characters can be used. Not Set: An Administrator password has not been set. Set: An Administrator password has been set. (The password may be cleared from the print server through a cold reset.)
Secure Web:	Specifies the use of encrypted communications between a browser and the HP Jetdirect embedded Web server. Optional (HTTPS/HTTP): Allows unencrypted communications using standard HTTP ports, as well as encrypted communications using HTTPS (secure HTTP). HTTPS Required: Only encrypted communications on HTTPS is allowed.
Cert Expires:	Specifies the expiration date of the digital certificate for SSL/TLS encrypted security. The date is in UTC format (for example, “2002-10-02 12:45 UTC”). Not Applicable: Displayed if a digital certificate has not been installed.

Table 9.4 Security Settings (2 of 2)

Message	Description
SNMP Versions:	Specifies the SNMP versions enabled on the print server. Disabled: All SNMP versions are disabled on the print server. No SNMP access is allowed. 1;2: SNMP v.1 and SNMP v.2c are supported, and SNMP v.3 is disabled, or not supported. 1;2;3-na/np: SNMP v.1, v.2c, and v.3 are enabled. v.3 is enabled with the minimum security of no authentication (“na”) and no privacy (“np”). 1;2;3-a/np: SNMP v.1, v.2c, and v.3 are enabled. v.3 is enabled with the minimum security of authentication enabled (“a”) but no privacy (“np”). 1;2;3-a/p: SNMP v.1, v.2c, and v.3 are enabled. v.3 is enabled with the minimum security of authentication (“a”) with privacy (“p”) enabled. 3-na/np: SNMP v.1 and v.2c are disabled. SNMP v.3 is enabled with the minimum security of no authentication (“na”) and no privacy (“np”). 3-a/np: SNMP v.1 and v.2c are disabled. SNMP v.3 is enabled with the minimum security of authentication enabled (“a”) but no privacy (“np”). 3-a/p: SNMP v.1 and v.2c are disabled. SNMP v.3 is enabled with the minimum security of authentication (“a”) with privacy (“p”) enabled.
SNMP Set Cmty Name:	Specifies whether an SNMP set community name has been configured on the HP Jetdirect print server. An SNMP set community name is a password for write access to SNMP control functions (SNMP SetRequests) on the HP Jetdirect print server. Not Specified: An SNMP set community name has not been set. Specified: A user-specified SNMP set community has been set.
Access List:	Identifies whether a host access control list is configured on the HP Jetdirect print server. A host access control list specifies the IP address of individual systems, or IP network of systems, that are allowed access to the print server and device. Specified: A host access list is configured on the HP Jetdirect print server. Not Specified: A host access list is not configured on the print server. All systems are allowed access.

Network Statistics

Information in this section of the Jetdirect configuration page is described in Table 9.5.

Table 9.5 Network Statistics (1 of 2)

Message	Description
TOTAL PACKETS RECEIVED:	Total number of frames (packets) received by the HP Jetdirect print server without error. This includes broadcast, multicast packets, and packets specifically addressed to the print server. This number does not include packets specifically addressed to other nodes.
UNICAST PACKETS RECEIVED:	Number of frames specifically addressed to this HP Jetdirect print server. This does not include broadcasts or multicasts.
BAD PACKETS RECEIVED:	Total number of frames (packets) received with errors by the HP Jetdirect print server.
FRAMING ERRORS RECEIVED:	Maximum of CRC (Cyclic Redundancy Check) errors and framing errors. CRC errors are frames received with CRC errors. Framing errors are frames received with alignment errors. A large number of framing errors could indicate a cabling problem with your network.
TOTAL PACKETS TRANSMITTED:	Total number of frames (packets) transmitted without error.
UNSENDABLE PACKETS:	Total number of frames (packets) not successfully transmitted because of errors.
TRANSMIT COLLISIONS:	Number of frames not transmitted because of repeated collisions.
TRANSMIT LATE COLLISIONS:	Total number of frames not transmitted because a late collision occurred. Late collisions often occur when cable lengths exceed network specifications. A large number may indicate a cabling problem on the network.
LINE ERRORS RCVD:	Total number of Token Ring frames received by the HP Jetdirect print server with code violations or CRC (Cyclic Redundancy Check) errors. A large number may indicate faulty cabling on your network.
BURST ERRORS RCVD:	Number of times the HP Jetdirect Token Ring print server could detect no transitions for 5 half-bit times between the Start Delimiter (SD) and the End Delimiter (ED).

Table 9.5 Network Statistics (2 of 2)

Message	Description
FRAME COPIED RCVD:	Total number of Token Ring frames received with the frame copy error indicated in the Frame Status (FS) field.
BAD LENGTH RCVD:	The number of Token Ring frames received with frame length errors.
LOST FRAMES:	The number of Token Ring frames lost.
TOKEN ERRORS:	Total number of times a violation of the token-passing protocol has been detected.

TCP/IP Protocol Information

Information in this section of the Jetdirect configuration page is described in Table 9.6. For error messages, see Table 9.12.

Table 9.6 TCP/IP Configuration Information (1 of 4)

Message	Description
STATUS:	Current TCP status. READY: Indicates the HP Jetdirect print server is awaiting data over TCP/IP. DISABLED: Indicates that TCP/IP was manually disabled. INITIALIZING: Indicates that the print server is searching for the BOOTP server, or trying to get the configuration file through TFTP. An additional status message may also be displayed. An error code and message is displayed if the print server is not ready. For more information, see Table 9.12.
HOST NAME:	The host name configured on the print server. It may be truncated. NOT SPECIFIED: Indicates that no host name was specified in a BOOTP response or TFTP configuration file. NPIxxxxxx: The default name is NPIxxxxxx, where xxxxxx represents the last six digits of the LAN hardware (MAC) address.
IP ADDRESS:	The Internet Protocol (IP) address assigned to the HP Jetdirect print server. This is a required entry for operation of the print server on a TCP/IP network. During initialization, a temporary value 0.0.0.0 is displayed. After two minutes, a default IP address 169.254/16 or 192.0.0.192 is assigned. NOT SPECIFIED: Indicates that an IP address is not assigned or the value is zero.
SUBNET MASK:	The IP subnet mask configured on the HP Jetdirect print server. During initialization, a temporary value 0.0.0.0 is displayed. Depending on configuration parameters, the print server may automatically assign a usable default value. NOT SPECIFIED: Indicates that a subnet mask is not configured.

Table 9.6 TCP/IP Configuration Information (2 of 4)

Message	Description
DEFAULT GATEWAY:	The IP address of the gateway used when sending packets off the local network. Only one default gateway may be configured. During initialization, a temporary value 0.0.0.0 is displayed. If not provided, the IP address of the Jetdirect print server is used. NOT SPECIFIED: Indicates that a default gateway is not configured.
CONFIG BY:	Identifies how the HP Jetdirect print server obtained its IP configuration: BOOTP: Automatic configuration through a BOOTP server. BOOTP/TFTP: Automaticautomatic configuration through a BOOTP server and TFTP configuration file. DHCP: Automatic configuration through a DHCP server DHCP/TFTP: Automatic configuration through a DHCP server and TFTP configuration file. RARP: Automatic configuration through the Reverse Address Resolution Protocol. USER SPECIFIED: Manual configuration through Telnet, the printer's control panel, HP Web Jetadmin, embedded Web server, or other method. DEFAULT IP: The default IP address was assigned. This address may not be a valid address for your network. AUTO IP: A link-local IP address (169.254.x.x) was assigned. If the network is a link-local network, this address should be valid. NOT CONFIGURED: The print server was not configured with IP parameters. Verify that TCP/IP is enabled, or check for error status.
BOOTP SERVER: or DHCP SERVER: or RARP SERVER:	Displayed if BOOTP, DHCP, or RARP is used for TCP/IP configuration. It specifies the IP address of the system that responds to the HP Jetdirect print server's request for automatic TCP/IP configuration over the network. NOT SPECIFIED: Indicates that the configuration server's IP address could not be determined or was set to zero in the response packet.
BOOTP/DHCP SERVER:	Displayed during initialization while the HP Jetdirect print server attempts to obtain its TCP/IP configuration from a BOOTP or DHCP server. The temporary address displayed is 0.0.0.0.

Table 9.6 TCP/IP Configuration Information (3 of 4)

Message	Description
TFTP SERVER:	The IP address of the system where the TFTP configuration file is located. During initialization, the temporary address 0.0.0.0 is displayed. NOT SPECIFIED: Indicates that a TFTP server has not been not been set.
CONFIG FILE:	The name of the HP Jetdirect configuration file. The file pathname may be truncated to fit on two lines. NOT SPECIFIED: Indicates that a file was not specified in the BOOTP reply from the host.
DOMAIN NAME:	The Domain Name System (DNS) name of the domain in which the HP Jetdirect print server resides (for example, support.company.com). It is not the fully qualified DNS name (for example, printer1.support.company.com) because the host printer name is not included. NOT SPECIFIED: Indicates that a domain name has not been configured on the print server.
DNS SERVER:	The IP address of the Domain Name System (DNS) server. NOT SPECIFIED: Indicates that a DNS server's IP address has not been configured on the print server.
WINS SERVER:	The IP address of the Windows Internet Name Service (WINS) server. NOT SPECIFIED: Indicates that a WINS server's IP address has not been configured on the print server.
SYSLOG SERVER:	The IP address of the syslog server configured on the print server. NOT SPECIFIED: Indicates that a syslog server has not been configured.
IDLE TIMEOUT:	The timeout value expressed in seconds after which the print server closes an idle TCP print data connection. Acceptable values are integers between 0 and 3600. A value of zero turns off the timeout mechanism. The default value is 270 seconds.
SLP:	Specifies whether the HP Jetdirect print server sends Service Location Protocol (SLP) packets used by system applications for automated installation. ENABLED: The print server sends SLP packets. DISABLED: The print server does not send SLP packets.

Table 9.6 TCP/IP Configuration Information (4 of 4)

Message	Description
WEB JETADMIN URL:	If the HP Jetdirect print server is found on the network by HP Web Jetadmin, the URL of the host system used for HP Web Jetadmin services is displayed. The URL is limited to two lines and may be truncated. NOT SPECIFIED: Indicates that the URL of the Web Jetadmin host system could not be identified or is not configured.

IPX/SPX Protocol Information

Information in this section of the Jetdirect configuration page is described in Table 9.7. For error messages, see Table 9.12.

Table 9.7 IPX/SPX Configuration Information (1 of 2)

Message	Description
STATUS:	Indicates the current IPX/SPX protocol status. READY: Indicates the HP Jetdirect print server is awaiting data over IPX/SPX. DISABLED: Indicates that IPX/SPX was manually disabled. INITIALIZING: Indicates that the print server is registering the node address or name. An additional status message may also be displayed. An error code and message is displayed if the print server is not ready. For more information, see Table 9.12.
PRIMARY FRAME TYPE:	Specifies the frame type selection on the Jetdirect print server. AUTO SELECT: The print server automatically senses and limits the frame type to the first one detected. EN_8023: Limits the frame type to IPX over IEEE 802.3 frames. All others will be counted and discarded. EN_II: Limits the frame type to IPX over Ethernet frames. All others will be counted and discarded. EN_8022: Limits the frame type to IPX over IEEE 802.2 with IEEE 802.3 frames. All others will be counted and discarded. EN_SNAP: Limits the frame type to IPX over SNAP with IEEE 802.3 frames. All others will be counted and discarded. TR_8022: Limits the frame type to IPX over IEEE 802.2 with IEEE 802.5 frames. All others will be counted and discarded. TR_SNAP: Limits the frame type to IPX over SNAP with IEEE 803.5 frames. All others will be counted and discarded.

Table 9.7 IPX/SPX Configuration Information (2 of 2)

Message	Description
NETWORK XXXXXX XXXXXX XXXXXX XXXXXX	The first column (Network) indicates the network number associated with a protocol frame type used for communication between a server and the HP Jetdirect print server. UNKNOWN: Indicates that the HP Jetdirect print server is still trying to determine which network number to use.
FRAME TYPE XXXXX XXXXX XXXXX XXXXX	The second column (Frame Type) identifies the frame type used with the associated network number: EN_8023, EN_8022, EN_II, EN_SNAP, TR_8022, TR_SNAP. Unless a specific frame type has been manually configured, the print server automatically determines the protocol frame type by listening to the network data being transferred over the network. DISABLED: Indicates that a specific frame type for that network has been manually configured.
RCVD XXXX XXXX XXXX XXXX	The third column (RCVD) indicates how many packets have been received for each frame type.

Novell NetWare Parameters

Information in this section of the Jetdirect configuration page is described in Table 9.8. For error messages, see Table 9.12.

Table 9.8 Novell NetWare Configuration Information (1 of 2)

Message	Description
STATUS:	Indicates the current Novell NetWare configuration status. READY: Indicates the HP Jetdirect print server is awaiting data. DISABLED: Indicates that IPX/SPX was manually disabled. INITIALIZING: Indicates that the print server is registering the node address or name. An additional status message may also be displayed. An error code and message is displayed if the print server is not ready. For more information, see Table 9.12.
NODE NAME:	Queue Server Mode: The print server name. This name must match a valid print server on the appropriate NetWare file server. The default name is NPIXXXXXX, where XXXXXX is the last six digits of the LAN hardware (MAC) address. Remote Printer Mode: The name you gave the network printer when you configured the network printer. The default name is NPIXXXXXX.
NETWARE MODE:	The mode used by the HP Jetdirect print server. QUEUE SERVER: Indicates that the print server receives data directly from the queue. REMOTE PRINTER (followed by the printer number): Indicates that the print server emulates a Novell NetWare remote printer. If the printer is not configured, this field displays QUEUE SERVER.
NDS TREE NAME:	Displays the name of the Novell Directory Services (NDS) tree for this printer. NDS is a database of objects on a NetWare network organized in a hierarchical tree structure. NOT SPECIFIED or blank: NDS is disabled.
NDS CONTEXT:	Displays the fully qualified NDS name where the HP Jetdirect print server object resides in the NDS tree. For example: CN=lj_pserver.OU=support.OU=mycity.OU=mycompany NOT SPECIFIED or blank: NDS is disabled.

Table 9.8 Novell NetWare Configuration Information (2 of 2)

Message	Description
ATTACHED SERVER:	The Attached Server field identifies the Jetdirect discovery method [NSQ] (Nearest Service Query) or [GSQ] (General Service Query) and the name of the proxy file server used to locate the configured bindery servers. NOT SPECIFIED or blank: A NetWare server has not been configured.
QUEUE POLL INTERVAL	(Job Poll Interval) Specifies the time interval (seconds) that the HP Jetdirect print server waits to check for print jobs in a print queue. The default is 2 seconds.
SAP INTERVAL:	Specifies the time interval (seconds) that the HP Jetdirect print server waits between Service Advertising Protocol (SAP) broadcasts on the network. The default is 60 seconds.
SERVER x:	Identifies a NetWare file server to which the HP Jetdirect print server is attached.

AppleTalk Protocol Information

Information in this section of the Jetdirect configuration page (Ethernet Only) is described in Table 9.9. For error messages, see Table 9.12.

Table 9.9 AppleTalk Configuration Information

Message	Description
STATUS:	Indicates the current AppleTalk configuration status. READY: Indicates the HP Jetdirect print server is awaiting data. DISABLED: Indicates that AppleTalk was manually disabled. INITIALIZING: Indicates that the print server is registering the node address or name. An additional status message may also be displayed. An error code and message is displayed if the print server is not ready. For more information, see Table 9.12.
NAME:	The name of the printer on the AppleTalk network. A number after the name indicates that there are multiple devices with this name, and this is the Nth instance of the name.
ZONE:	The name of the AppleTalk network zone on which the printer is located.
TYPE:	The type of the printer being advertised on the network. Two types can be displayed.
NETWORK NUMBER: NODE NUMBER:	NETWORK NUMBER: Identifies the AppleTalk Network Number on which the HP Jetdirect print server is currently operating. NODE NUMBER: Identifies the AppleTalk Node Number that the print server chose for itself as part of its initialization sequence. Note: The AppleTalk phase 2 (P2) parameter is preconfigured on the HP Jetdirect print server.

DLC/LLC Protocol Information

Information in this section of the Jetdirect configuration page is described in Table 9.10.

Table 9.10 DLC/LLC Configuration Information

Message	Description
STATUS:	Indicates the current DLC/LLC protocol status. READY: Indicates the HP Jetdirect print server is awaiting data. DISABLED: Indicates that DLC/LLC was manually disabled. INITIALIZING: Indicates that the print server is registering the node address or name. An additional status message may also be displayed. An error code and message is displayed if the print server is not ready. For more information, see Table 9.12.

Token Ring Diagnostics

Information in this section of the Jetdirect configuration page (Token Ring Only) is described in Table 9.11.

Table 9.11 Token Ring Diagnostic Information (1 of 2)

Message	Description
Status:	Identifies a status condition. Ready: Indicates successful access to the Token Ring network. Error: Indicates an error condition. See the error codes and ring status messages for more information.
Code:	The following open command error codes may be detected: Function Failure: The HP Jetdirect print server is unable to transmit to itself while wrapped through its lobe at the Token Ring wiring concentrator. This message may also indicate that data frames were received before physical insertion. Signal Loss: Indicates one of the following: ● The HP Jetdirect print server has detected a loss of signal on the ring. Check the cable from the HP Jetdirect print server to the network and check the wiring concentrator. ● A signal loss condition has been detected at the HP Jetdirect print server receiver input during the open process (either when wrapped or inserted onto the ring). Timeout: The HP Jetdirect print server fails to logically insert onto the ring before the insertion timer expires. Each phase of the insertion process must complete before expiration of the 18-second insertion timer. Ring Failure: The HP Jetdirect print server times out when attempting a ring purge after becoming the active monitor; that is, the HP Jetdirect print server is unable to receive its own ring purge data frames. Ring Beaconing: The HP Jetdirect print server receives a beacon data frame after physically inserting into the ring. This indicates a break in the ring. Dup Node Address: The HP Jetdirect print server found another station on the ring that already has the address which the HP Jetdirect print server wishes to use. Make sure that all addresses are unique.

Table 9.11 Token Ring Diagnostic Information (2 of 2)

Message	Description
	Request Param: The HP Jetdirect print server determines that a Ring Parameter Server (RPS) is present on the ring, but does not respond to a request initialization data frame. Remove Received: The HP Jetdirect print server has received a Remove Adapter data frame during the Token Ring insertion process, or has received a remove ring station data frame request, and has removed itself from the ring.
Ring Status:	The following Ring Status may be detected: Ring Recovery: The HP Jetdirect print server has received claim-token data frames on the ring. The HP Jetdirect print server may be transmitting the claim-token frames. Single Station: The HP Jetdirect print server has sensed that it is the only station on the ring. Remove Received: The HP Jetdirect print server has received a Remove Adapter data frame during the Token Ring insertion process, or has received a remove ring station data frame request, and has removed itself from the ring. Auto-Removal Error: The HP Jetdirect print server detected an internal hardware error following the Token Ring beacon auto-removal process and has removed itself from the ring. Lobe Wire Fault: The HP Jetdirect print server has detected an open or short circuit in the cable between the HP Jetdirect print server and the Token Ring wiring concentrator. Verify that this cable is functional and replace it if necessary. Transmit Beacon: The HP Jetdirect print server is transmitting beacon frames to the ring. Hard Error: The HP Jetdirect print server is transmitting or receiving beacon frames to or from the ring. Signal Loss: Indicates one of the following: ● The HP Jetdirect print server has detected a loss of signal on the ring. Check the cable from the HP Jetdirect print server to the network and check the wiring concentrator. ● A signal loss condition has been detected at the HP Jetdirect print server receiver input during the open process (either when wrapped or inserted onto the ring).

Error Messages

Error codes and messages that may appear in the Status sections of the Jetdirect configuration page are described in Table 9.12.

Table 9.12 Error Messages (1 of 11)

Error Code and Message	Description
02 LAN ERROR - INTERNAL LOOPBACK	During self-test, the HP Jetdirect print server detected an internal loopback test error. The print server may be faulty. If the error persists, replace the HP Jetdirect print server.
03 LAN ERROR - EXTERNAL LOOPBACK	The HP Jetdirect print server is incorrectly connected to your network or is defective. Make sure your HP Jetdirect print server is correctly attached to your network. In addition, check the cabling and connectors.
05 NO SIGNAL DETECTED	(802.11b Wireless, Infrastructure Mode only) The print server did not find an Access Point and did not detect a radio signal. Check for sources of radio signal interference. If possible, elevate the print server or the external antenna (if applicable). Verify other wireless devices are turned on and located in wireless signal range of the print server.
06 ENCRYPTION REQUIRED	(802.11b Wireless) Encryption is required on this network, but the print server cannot communicate on the network due to improper encryption settings. Check the wireless encryption settings configured on the print server.
07 LAN ERROR - CONTROLLER CHIP	(Wired Ethernet) Check the network connections. If the connections are intact, run the power-on self-test: turn the printer off, then on again. If the error persists, replace the HP Jetdirect print server.
07 AUTHENTICATION FAILED	(802.11b Wireless) The Jetdirect print server could not access the network because of an authentication error. The error depends on the authentication method used. Verify the authentication method and settings on the print server. If the print server is configured for Open System authentication while the network Access Point requires EAP, an authentication failure will result even though the print server is operating properly.
08 LAN ERROR - INFINITE DEFERRAL	There is a network congestion problem. **Note:** If the print server is not connected to the network, this error cannot occur.
08 AUTHENTICATION IN PROGRESS	(802.11b Wireless) Link-level authentication is in progress. If the print server is in Infrastructure mode, server-based authentication may also be in progress.

Table 9.12 Error Messages (2 of 11)

Error Code and Message	Description
09 LAN ERROR - BABBLE	Check the network connections. If the connections are intact, run the power-on self-test: turn the printer off, then on again. If the error persists, replace the HP Jetdirect print server. For replacement instructions, see the hardware installation guide for your print server.
09 SCANNING FOR SSID	(802.11b Wireless) The print server is scanning on all channels for devices on the specified SSID (network name). Check your specified SSID, or check status of the Access Point (Infrastructure mode) or other wireless devices. The print server will continue to scan for the specified SSID.
0A LAN ERROR - NO SQE	(Wired Ethernet) Check the network connections. If the connections are intact, run the power-on self-test: turn the printer off, then on again. If the error persists, replace the HP Jetdirect print server.
0A LAN ERROR - OPEN	(Token Ring) The HP Jetdirect print server could not insert into the ring and join the network. Check the data rate switch on the HP Jetdirect print server to make sure it is set correctly. For information on setting the data rate switch, see the HP Jetdirect internal print server hardware installation guides. In addition, check the cabling, external transceiver, wiring concentrator, and taps.
0C LAN ERROR - RECEIVER OFF	There may be a problem with your network cabling or the HP Jetdirect print server. Check the cabling and connectors on your Ethernet network. If you cannot find a problem with your network cabling, run the power-on self-test: turn the printer off, then on again. If the error persists after the printer is turned on again, there is a problem with the HP Jetdirect print server.
0D LAN ERROR - TRANSMITTER OFF	There may be a problem with your network cabling or the HP Jetdirect print server. Check the cabling and connectors on your Ethernet network. If you cannot find a problem with your network cabling, run the power-on self-test: turn the printer off, then on again. If the error persists, there is a problem with the HP Jetdirect print server.
0E LAN ERROR - LOSS OF CARRIER	Check the network connections. If the connections are intact, run the power-on self-test: turn the printer off, then on again. If the error persists, replace the HP Jetdirect print server.
0F LAN ERROR - WIRE FAULT	(Token Ring) The HP Jetdirect print server has detected an open or short circuit in the cable between the HP Jetdirect print server and the Token Ring wiring concentrator. Verify that this cable is functional and replace it if necessary.

Table 9.12 Error Messages (3 of 11)

Error Code and Message	Description
10 LAN ERROR - UNDERFLOW	(Wired Ethernet) There may be a problem with your network cabling or the HP Jetdirect print server. Check the cabling and connectors on your network. If you cannot find a problem with your network cabling, run the power-on self-test: turn the printer off, then on again. If the error persists, there is a problem with the HP Jetdirect print server.
10 LAN ERROR-AUTO REMOVAL	(Token Ring) The HP Jetdirect print server detected an internal hardware error following the Token Ring beacon auto-removal process and has removed itself from the ring.
11 LAN ERROR - RETRY FAULTS	(Wired Ethernet) There is a problem with your network cabling or external network configuration. Verify operation of the hub or switch port.
11 LAN ERROR - REMOVE RECEIVE	(Token Ring) The HP Jetdirect print server has received a Remove Adapter data frame during the Token Ring insertion process, or has received a remove ring station data frame request, and has removed itself from the ring.
12 LAN ERROR - NO LINKBEAT	With a 10/100 Base-TX port connected, this message is displayed if Link Beat is not sensed. Check the network cable, and verify that the concentrator/hub is providing Link Beat.
13 NETWORK RECONFIG - MUST REBOOT	Reset or power off/on the HP Jetdirect print server to enable new configuration values.
14 DISCONNECTED	The Novell NetWare protocol is disconnected. Check the server and the print server.
15 CONFIGURATION ERROR	(Ethernet) The configuration information for the NetWare functions is not stored correctly on the HP Jetdirect print server. Use the installation software, embedded Web server, or other tools to reconfigure the print server. If this error persists, there may be a problem with the HP Jetdirect print server.
16 NOT CONFIGURED	(Ethernet) The HP Jetdirect print server has not been configured for NetWare. Use the installation software, embedded Web server, or other tools to configure the print server for NetWare networks.

Table 9.12 Error Messages (4 of 11)

Error Code and Message	Description
17 UNABLE TO FIND SERVER	(Ethernet) The HP Jetdirect print server was unable to find the NetWare print server (Remote Printer mode) or file server (Queue Server mode). (There was no response to service queries for advertising print servers or file servers that matched the configured print server or file server name.) Make sure that the print server or file server is running and that the print server or file server name configured on the HP Jetdirect print server matches the actual name used by the print server or file server. Also make sure that all cables and routers are functioning correctly.
18 PASSWORD ERROR	The HP Jetdirect print server detected that the password for the NetWare print server object is wrong. Use a NetWare utility (such as PCONSOLE) to erase the password for the print server object. When the HP Jetdirect print server logs on again, it sets a new password. Note: When multiple file servers are configured, the error is only displayed on the configuration page if none of the file servers are connected.
19 NO QUEUE ASSIGNED	The HP Jetdirect print server detected that the print server object has not been assigned any queues to service. Assign queues to the print server object using printer installation or NetWare utilities. Note: When multiple file servers are configured, the error is only displayed on the configuration page if none of the file servers were successfully connected.
1A PRINTER NUMBER NOT DEFINED	A NetWare printer number for this printer has not been configured. Assign a valid printer number to the HP Jetdirect print server. Use a NetWare utility (such as PCONSOLE), the Jetdirect embedded Web server, or other tool to assign a printer number.
1B PRINTER NUMBER IN USE	The NetWare printer number assigned to the printer is already in use by another printer. Assign an unused printer number. This may also occur when a printer is powered off/on, in which case the error goes away after the print server times out and detects the lost connection.
1C PRINT SERVER NOT DEFINED	The file server does not have a print server object that corresponds to the specified NetWare node name. Use printer installation software, a NetWare utility (such as PCONSOLE), or other tool to create the print server object. When the HP Jetdirect print server is configured for multiple file servers, the error is only displayed on the configuration page if none of the file servers made the connection.

Table 9.12 Error Messages (5 of 11)

Error Code and Message	Description
1D UNABLE TO CONNECT TO SERVER	**Remote Printer mode error:** The HP Jetdirect print server was unable to establish an SPX connection with the NetWare print server. Make sure that the NetWare print server is running and that all cables and routers are functioning correctly.
1E FAIL RESERVING PRINTER NUM	The SPX connection to the print server was lost when the HP Jetdirect print server attempted to reserve the printer number. This indicates a possible network problem, or a problem with the print server. Make sure all cables and routers are functioning correctly. Try restarting the print server.
1F ERR NEGOTIATING BUFFER SIZE	A failure was detected when selecting the buffer size to be used when reading print data from the file server. This may indicate a network problem. When the HP Jetdirect print server is configured for multiple file servers, the error is only displayed on the configuration page if none of the file servers was successfully connected.
20 UNABLE TO LOGIN	A failure was detected when the HP Jetdirect print server tried to log onto the file server. This could be caused by the print server object not existing on the file server, or by a security check that prevents the print server from logging in. Make sure the file server name and print server object name are correct. Use PCONSOLE to erase the password for the print server object. Create a new print server object. When the HP Jetdirect print server is configured for multiple file servers, the error is only displayed on the configuration page if none of the file servers made the connection.
21 UNABLE TO SET PASSWORD	A failure was detected when the HP Jetdirect print server tried to set the password for the print server object. (Whenever the HP Jetdirect print server is able to log in without a password, it sets the password automatically.) This indicates a networking or security problem. Create a new print server object. When multiple file servers are configured, the error is only displayed on the configuration page if none of the file servers were successfully connected.
22 UNABLE TO CONNECT TO SERVER	**Queue Server mode error:** The HP Jetdirect print server could not establish an NCP connection to the file server. Make sure that the correct file servers are connected. When multiple file servers are configured, the error is only displayed on the configuration page if none of the file servers were successfully connected.

Table 9.12 Error Messages (6 of 11)

Error Code and Message	Description
23 UNABLE TO ATTACH TO QUEUE	A failure was detected when the HP Jetdirect print server tried to attach to one of the queues assigned to the print server object. This may be because no servers are allowed to attach to this queue. There may also be a networking or security problem. Use PCONSOLE to make sure that servers are allowed to attach to the queue, to delete the print server object from the list of queue servers if you want the HP Jetdirect print server to service other queues, or to delete the queue and create a new one (the print server object must be added to the list of queue servers). When the HP Jetdirect print server is configured for multiple file servers, the error is only displayed on the configuration page if none of the file servers made the connection.
24 PSERVER CLOSED CONNECTION	The NetWare print server requested a termination of the connection with the HP Jetdirect print server. No error exists or is indicated. Make sure the NetWare print server is running, and restart it if necessary.
25 DISCONNECTING - SPX TIMEOUT	The SPX connection to the print server was lost after the connection had been made. This indicates a possible network problem, or a problem with the print server. Make sure all cables and routers are functioning correctly. Try restarting the print server.
26 UNKNOWN NCP RETURN CODE	The HP Jetdirect print server encountered an unexpected fatal error after it had successfully connected to the file server. A wide variety of failures could produce this error message, including a downed file server or a network router failure.
27 UNEXPECTED PSERVER DATA RCVD	The print server sent some data when the HP Jetdirect print server had not given its permission to do so. This indicates a possible print server problem, possibly a software problem.
28 OUT OF BUFFERS	The HP Jetdirect print server was unable to allocate a buffer from its internal memory. This indicates all buffers are busy due possibly to heavy broadcast traffic or large amounts of network traffic directed to the print server.
29 UNABLE TO SENSE NET NUMBER	The HP Jetdirect print server has been trying for over 3 minutes to determine the NetWare protocol used on the network. Make sure that any file servers and routers are operating correctly. Make sure that the settings for NetWare frame type and source routing are correct.
2A NDS ERR: EXCEEDS MAX SERVERS	More queues were assigned than the HP Jetdirect print server can handle. Remove one or more print queues from the list to be serviced by Queue Server Mode.

Table 9.12 Error Messages (7 of 11)

Error Code and Message	Description
2B NDS ERR: UNABLE TO LOGIN	Unable to log onto the NetWare directory tree. Make sure that the print server object is defined in the directory at the correct context. Clear the print server password using NWADMIN or similar NetWare tool.
2C NDS AUTHENTICATION ERROR	Unable to log onto the NetWare directory tree. Make sure that the print server object is defined in the directory at the correct context.
2D NDS ERR: CHANGE PSSWRD FAILED	Cannot modify the print server password to the value expected by the HP Jetdirect print server.
2E NDS SERVER PUBLIC KEY ERROR	Print Server Object Name mismatch. Unable to read the file server's public key. Verify object names, or contact the NDS administrator.
2F NDS ERR: SRVR NAME UNRESOLVD	The file server on the network cannot be located. The server may not be running at this time or a communications problem may exist.
30 NDS PRINT SERVER NAME ERROR	The HP Jetdirect print server object cannot be located in the specified NDS context.
31 NDS PS PRINTER LIST ERROR	Cannot locate a list of printers objects that should be assigned to the print server object.
32 NDS PRINTER OBJ NOTIFY ERR	The list of notification objects assigned to the printer object cannot be located.
33 NDS PRINT OBJ QUEUE LIST ERR	The list of print queues assigned to the printer objects cannot be located.
34 NDS ERR: UNRESOLVD PRNTR OBJ	The printer object cannot be located in the NDS directory.
35 NDS ERR: INVALID SRVR VERS	The current version of the NetWare file server is not supported.
36 NDS ERR: NO PRINTER OBJECTS	No printer objects are assigned to the print server object configured to this HP Jetdirect print server.
37 NDS ERR: MAX PRINT OBJECTS	Too many printer objects are assigned to the print server object. Using NetWare utilities (such as NWADMIN), reduce the number of printer objects assigned to the print server.
38 NDS ERR: NO QUEUE OBJECTS	No print queue objects are assigned to the printer objects located in the NDS directory.
39 NDS ERR: MAX QUEUE OBJECTS	Too many print queue objects are assigned to the printer. Reduce the number of queues assigned.

Table 9.12 Error Messages (8 of 11)

Error Code and Message	Description
3A NDS ERR: UNABLE TO FIND TREE	The NDS tree cannot be located. The message may occur when the file server is not running or when a network communications problem exists.
3B NDS CONNECTION STATE ERROR	The HP Jetdirect print server cannot change the NDS connection state. Check licenses on the spooling server.
3C NDS ERR: UNRESOLVED QUEUE	The print queue object cannot be located in the specified NDS context.
3D NDS ERR: CANNOT READ Q HOST	Cannot locate the file server on the network. The server may not be running at this time or a communications problem may exist.
3E NDS PRNT SRVR PUBLIC KEY ERR	Print Server Object Name mismatch. Unable to read the print server's public key. Verify object names. Verify that the object key assigned to the HP Jetdirect print server is a print server object and not a printer or other object.
3F UNABLE TO GET NDS SRVR ADDR	The NDS server address cannot be located or accessed.
40 ARP DUPLICATE IP ADDRESS	The ARP layer has detected another node on the network using the same IP address as the HP Jetdirect print server. Extended error information below this message shows the hardware address of the other node.
41 NOVRAM ERROR	The HP Jetdirect print server cannot read the contents of its NOVRAM.
42 INVALID IP ADDRESS	The IP address specified for the HP Jetdirect print server (through BOOTP) is an invalid IP address for specifying a single node. Check your Bootptab file for proper entries.
43 INVALID SUBNET MASK	The IP subnet mask specified for the HP Jetdirect print server (through BOOTP) is an invalid subnet mask. Check your Bootptab file for proper entries.
44 INVALID GATEWAY ADDRESS	The default gateway IP address specified for the HP Jetdirect print server (through BOOTP) is an invalid IP address for specifying a single node. Check your Bootptab file for proper entries.
45 INVALID SYSLOG ADDRESS	The syslog server IP address specified for the HP Jetdirect print server (through BOOTP) is an invalid IP address for specifying a single node. Check your Bootptab file for proper entries.

Table 9.12 Error Messages (9 of 11)

Error Code and Message	Description
46 INVALID SERVER ADDRESS	The TFTP server IP address specified for the HP Jetdirect print server (through BOOTP) is an invalid IP address for specifying a single node. Check your Bootptab file for proper entries.
47 INVALID TRAP DEST ADDRESS	One of the SNMP trap (Trap PDU) destination IP addresses specified for the HP Jetdirect print server (through TFTP) is an invalid IP address for specifying a single node. Check your TFTP configuration file.
48 CF ERR - FILE INCOMPLETE	The TFTP configuration file contained an incomplete last line that did not end in a newline character.
49 CF ERR - LINE TOO LONG	A line being processed in the TFTP configuration file was longer than the HP Jetdirect print server could accept.
4A CF ERR - UNKNOWN KEYWORD	A TFTP configuration file line contained an unknown keyword.
4B CF ERR - MISSING PARAMETER	A line in the TFTP configuration file was missing a required parameter.
4C CF ERR - INVALID PARAMETER	A line in the TFTP configuration file contained an invalid value for one of the parameters on that line.
4D CF ERR - ACCESS LIST EXCEEDED	The TFTP configuration file specified too many access list entries using the “allow:” keyword.
4E CF ERR - TRAP LIST EXCEEDED	The TFTP configuration file specified too many trap destination list entries using the “trap-destination:” keyword.
4F TFTP REMOTE ERROR	The TFTP transfer of the configuration file from the host to the HP Jetdirect print server failed with the remote host sending a TFTP ERROR packet to the print server.
50 TFTP LOCAL ERROR	The TFTP transfer of the configuration file from the host to the HP Jetdirect print server failed with the local print server encountering some form of inactivity timeout, or excessive retransmissions situation.
51 TFTP RETRIES EXCEEDED	The overall retrying of the TFTP transfer of the configuration file from the host to the HP Jetdirect print server has exceeded a retry limit.
52 BAD BOOTP/DHCP REPLY	An error was detected in the BOOTP or DHCP reply that the HP Jetdirect print server received. The reply either had insufficient data in the UDP datagram to contain the minimum BOOTP/DHCP header of 236 bytes, had an operation field that was not BOOTPREPLY(0X02), had a header field that did not match the print servers hardware address, or had a UDP source port that was not the BOOTP/DHCP server port (67/udp).

Table 9.12 Error Messages (10 of 11)

Error Code and Message	Description
53 BAD BOOTP TAG SIZE	The tagsize in a vendor-specific field in the BOOTP reply is either 0, or greater than the remaining number of unprocessed bytes in the vendor-specified area.
54 BOOTP/RARP IN PROGRESS	The HP Jetdirect print server is currently in the process of obtaining its basic IP configuration information through BOOTP/RARP.
55 BOOTP/DHCP IN PROGRESS	The HP Jetdirect print server is currently in the process of obtaining its basic IP configuration information through BOOTP/DHCP, and has not detected any errors.
56 DHCP NAK	The HP Jetdirect print server received a negative acknowledgement message from the DHCP server in response to a configuration request.
57 UNABLE TO CONNECT DHCP SVR	The HP Jetdirect print server had received IP parameters from a DHCP server, but communication with the DHCP server has been lost. Check status of the DHCP server. If an infinite lease was assigned, the print server will use the IP address of the most recent DHCP server used, but operation may be degraded until a DHCP server responds.
58 POSTSCRIPT MODE NOT SELECTED	The printer does not support AppleTalk or AppleTalk extensions.
59 INCOMPLETE F/W - MUST DOWNLOAD	Firmware download message. Currently downloading firmware to the HP Jetdirect print server, or the download did not complete properly.
5A TURN PRINTER OFF / ON	Firmware download message. Download of firmware is complete. Power off/on the HP Jetdirect print server.
5C DHCP BAD REPLY	A bad reply was received from the DHCP server. Check your DHCP server settings for this print server.
5D DHCP LEASE DURATION TOO SHORT	The DHCP lease times for this print server's TCP/IP configuration settings are too short. Reconfigure the DHCP lease times on the DHCP server.
5E DHCP LEASE RELEASED	The lease for DHCP-configured parameters, including the IP address, have been released through a manual configuration method, such as through the printer's control panel.
5F WINS REGISTRATION FAILED	Attempts to register the print server's name on the WINS server failed. Check for duplicate names, or verify the WINS server configuration.
61 AUTO IP CONFIGURED	An IP address could not be retrieved over the network. The print server will default to an IP address using link-local addressing in the form 169.254.x.x.

Table 9.12 Error Messages (11 of 11)

Error Code and Message	Description
62 DEFAULT IP CONFIGURED	An IP address could not be retrieved over the network. The print server will default to a legacy default IP address 192.0.0.192.
63 AUTO IP IN PROGRESS	The print server is automatically assigning an IP address using link-local addressing in the form 169.254.x.x.
64 INVALID PASSWORD	An invalid password was specified through TFTP. Verify that the password consists of a maximum of 16 printable characters.
83 DISCONNECTING FROM SERVER	The server has been shut down because of a configuration change or reset request. This message automatically clears after a few seconds, unless the printer is offline, is in an error state, or is servicing another I/O port or another network protocol.
84 DHCP LEASE TIMERS ADJUSTED	The print server detected a DHCP lease error due to one of the following conditions: ● Renew time is less than 30 seconds. ● Rebind time is less than 52 seconds. ● Rebind time is less than, or equal to, the Renew time. ● The lease duration is less than, or equal to, the Rebind time.
86 FOR MULTILANGUAGES UPGRADE AGAIN	When upgrading a supported print server that contains a firmware version prior to X.24.00, it will be necessary to perform the firmware upgrade again if you want the print server to support management tools (for example, the embedded Web server) using non-English languages.
F1 TRYING TO CONNECT TO SERVER	The HP Jetdirect print server is trying to connect to the NetWare server(s). This is a normal message. Wait until either the connection is established or another status message appears.
F2 TFTP IN PROGRESS	The print server is attempting to use TFTP to obtain TCP/IP configuration settings over the network.
F3 BOOTP/RARP IN PROGRESS	The print server is attempting to use BootP or RARP to obtain TCP/IP configuration settings over the network.
F4 BOOTP/DHCP IN PROGRESS	The print server is attempting to use BootP or DHCP to obtain TCP/IP configuration settings over the network.

TCP/IP Overview

Introduction

This appendix is intended to provide information to help you gain a basic understanding of TCP/IP.

Similar to a common language that people use to communicate with each other, TCP/IP (Transmission Control Protocol/Internet Protocol) is a suite of protocols designed to define the way computers and other devices communicate with each other over a network.

TCP/IP is rapidly becoming the most used set of protocols. The main reason this is happening is the fact that the Internet is based on TCP/IP. If you have a network that you wish to connect to the internet, you must be using TCP/IP to communicate.

Internet Protocol (IP)

When information is sent across the network, the data is broken down into small packets. Each packet is sent independently of one another. Each packet is encoded with IP information, such as the IP address of the sender and receiver. IP packets can be routed over routers and gateways, devices that connect a network with other networks.

IP communications is connectionless. When IP packets are sent, there is no guarantee that they arrive at their destination in the proper sequence. That task can be performed by higher level protocols and applications thereby allowing IP communications to be efficient.

Each node or device that will communicate directly onto the network requires an IP address, including HP Jetdirect-connected devices.

Transmission Control Protocol (TCP)

TCP handles breaking the data into packets and recombining the packets on the receiving end by providing a connection-oriented, reliable, and guaranteed delivery service to another node on the network. When data packets are received at their destination, TCP calculates a checksum for each packet to verify the data is not corrupt. If the data in the packet has been corrupted during transmission, TCP discards the packet and requests that the packet be resent.

User Datagram Protocol (UDP)

UDP provides similar services to TCP. However, UDP does not acknowledge data receipt and supports request/reply transactions with no added reliability or guarantee of delivery. UDP is used when acknowledgment and reliability are not required, such as during a "discovery broadcast."

IP Address

Every host (workstation or node) on an IP network requires a unique IP address for each network interface. This address is a software address that is used to identify both the network and specific hosts located on that network. Each IP address can be divided into two separate parts: the network portion and the host portion. It is possible for a host to query a server for a dynamic IP address each time the device boots-up (for example, using DHCP and BootP).

Note When assigning IP addresses, always consult the IP address administrator. Setting the wrong address can disable other equipment operating on the network or interfere with communications.

IP Address: (Network Portion)

Network addresses are managed by an organization in Norfolk, Virginia recognized as InterNIC. InterNIC has been contracted by the National Science Foundation to manage the Internet addresses and domains. Network addresses are distributed to organizations that are in turn responsible for making sure all attached devices or hosts on the network are properly numbered. For more information on the network portion of an IP address, see "IP Address Structure and Class" and "Subnets" later in this appendix.

IP Address: (Host Portion)

Host addresses numerically identify specific network interfaces on an IP network. Usually a host has only one network interface; thus, only one IP address. Because no two devices can share the same number at the same time, administrators typically maintain address tables to assure correct assignment of addresses in the host network.

IP Address Structure and Class

An IP address is comprised of 32 bits of information and divided into 4 sections containing 1 byte each section or 4 bytes total: `xxx.xxx.xxx.xxx`

For efficiency in routing, networks were broken down into three classes, so routing can begin simply by identifying the leading byte of information in the IP address. The three IP addresses that InterNIC assigns are class A, B, and C. The network class determines what each of the four IP address sections identify as shown in Table A.1:

Table A.1 IP Address Class Format

Class	First Address Byte xxx.	Second Address Byte xxx.	Third Address Byte xxx.	Fourth Address Byte xxx
A	Network.	Host.	Host.	Host
B	Network.	Network.	Host.	Host
C	Network.	Network.	Network.	Host

As illustrated in Table A.2, each network class differs by the leading bit identifier, the address range, the number of each type available, and the maximum number of hosts each class allows.

Table A.2 Network Class Characteristics

Class	Leading Bit Identifier	Address Range	Maximum Number of Networks in the Class	Maximum Hosts in the Network
A	0	0.0.0.0 to 127.255.255.255	126	Over 16 Million
B	10	128.0.0.0 to 191.255.255.255	16,382	65,534
C	110	192.0.0.0 to 223.255.255.255	Over 2 Million	254

Configuring IP Parameters

TCP/IP configuration parameters (such as IP address, subnet mask, default gateway) can be configured on the HP Jetdirect print server in a variety of ways. These values can be configured manually (for example, through Telnet, the embedded Web server, the arp and ping commands, and HP management software), or they can be automatically downloaded using DHCP or BOOTP each time the print server is turned on. For configuration methods, see Chapter 3.

When powered on, a new HP Jetdirect print server that is unable to retrieve a valid IP address from the network will automatically assign itself a default IP address. The default IP address will depend on the type of network to which the print server is connected. On a small private network, a technique called link-local addressing is used to assign a unique IP address in the range of 169.254.1.0 to 169.254.254.255, which should be valid. On a large or enterprise network, a temporary address of 192.0.0.192 will be assigned until it is properly configured for your network. The IP address configured on your print server may be determined by inspecting the Jetdirect configuration page for the print server.

Dynamic Host Configuration Protocol (DHCP)

DHCP allows a group of devices to use a set of IP addresses that are maintained by a DHCP server. The device or host sends a request to the server, and if an IP address is available, the server assigns it to that device.

BOOTP

BOOTP is a bootstrap protocol used to download configuration parameters and host information from a network server. BOOTP uses UDP for its transport. In order for devices to boot and load configuration information into RAM, they must communicate through the bootstrap protocol BOOTP as a client with their server.

To configure the device, the client broadcasts a boot request packet containing at least the hardware address of the device (HP Jetdirect print server hardware address). The server answers with a boot reply packet containing the information the device needs to configure.

Subnets

When an IP network address for a particular network class is assigned to an organization, no provision is made for more than one network being present at that location. Local network administrators use subnets to partition a network into several different subnetworks. Splitting a network into subnets can result in better performance and improved use of limited network address space.

Subnet Mask

The subnet mask is a mechanism used to divide a single IP network into several different subnetworks. For a given network class, a portion of an IP address that would normally be used to identify a node is used, instead, to identify a subnetwork. A subnet mask is applied to each IP address to specify the portion used for subnetworks, and the portion used to identify the node. For example, see Table A.3.

Table A.3 Example: Subnet Mask 255.255.0.0 Applied to Class A Network

Class A Network Address	15	xxx	xxx	xxx
Subnet Mask	255	255	0	0
IP Address fields with Subnet Mask applied	**Network**	**Subnet**	**Host**	**Host**
Example of a node's IP Address on Subnet 1	15	1	25	7
Example of a node's IP Address on Subnet 254	15	254	64	2

As illustrated in Table A.3, the Class A IP network address "15" has been assigned to company ABC. To allow additional networks at company ABC's site, the subnet mask of 255.255.0.0 is used. This subnet mask specifies that the second byte of the IP address will be used to identify up to 254 subnets. Using this designation, each device is uniquely identified on its own subnet, but company ABC can incorporate up to 254 subnetworks without violating their assigned address space.

Gateways

Gateways (routers) are used to connect networks together. Gateways are devices that act as translators between systems that do not use the same communication protocols, data formatting, structures, languages, or architectures. Gateways repackage the data packets and change the syntax to match that of the destination system. When networks are divided into subnets, gateways are required to connect one subnet to another.

Default Gateway

The Default Gateway is the gateway or router that, if not specified, will be used to move packets between networks. It is specified by an IP address.

If multiple gateways or routers exist, then the default gateway is typically the address of the first, or nearest, gateway or router. If no gateways or routers exist, then the default gateway will typically assume the IP address of the network node (such as the workstation or HP Jetdirect print server).

Syslog Server

A syslog server is a system on the network (typically a UNIX system) that can receive and log syslog messages from other devices on the network. Syslog messages allow administrators to monitor status or troubleshoot network devices.

A syslog server requires software that provides syslog capabilities running on the server. UNIX systems provide a daemon, syslogd, that monitors User Datagram Protocol (UDP) port 514 for incoming messages. The messages are processed depending on their priority and on how syslogd is set up to operate.

You can configure the HP Jetdirect print server with the syslog server's IP address. When a syslog server is configured, both the HP Jetdirect print server and attached device can send syslog messages using UDP.

The syslog server may not receive all syslog events from the HP Jetdirect print server:

- UDP does not guarantee delivery of messages.
- The HP Jetdirect print server attempts to eliminate duplicate messages (to minimize unnecessary network traffic).
- The volume of messages sent by the HP Jetdirect print server is configurable.

Methods to configure HP Jetdirect syslog parameters include BOOTP, DHCP, Telnet, the embedded Web server, and management software. For selected printers, an EIO menu accessed through the printer control panel provides limited syslog configuration. The syslog configuration command or parameter entries may vary depending on the method used. For more information, see the applicable sections in this guide.

Selected syslog parameters on the HP Jetdirect print server are listed in Table A.4.

Table A.4 HP Jetdirect Syslog Parameters

Item	Description
Syslog Server IP address	IP address of a syslog server for sending syslog messages. If zero (0.0.0.0) or not specified, syslog messages are disabled.
Syslog Maximum Messages	The number of syslog messages that can be sent by the HP Jetdirect print server on a per-minute basis, from 0 to 1000. This parameter helps to control the syslog file size. The default is 10 messages per minute. If 0, the number of syslog messages is not restricted.
Syslog Priority	A method for filtering syslog messages that are sent to the syslog server. The range is 0 through 8, with 0 the most specific and 8 the most general. Only messages that are lower than the specified filter level (or higher in priority) are reported. The default is 8, messages of all priorities are sent. If 0, all syslog messages are disabled.
Syslog Facility	A code used to identify the source facility of a message (for example, to identify the source of selected messages during troubleshooting). By default, the HP Jetdirect print server uses LPR as the source facility code, but local user values of local0 through local7 can be used to isolate individual or groups of print servers.

Typical logfile entries of syslog messages are illustrated below:

```
Oct 22 08:10:33 jd08  printer: error cleared
Oct 22 15:06:07 jd04  printer: powered up
Oct 22 15:07:56 jd04  printer: offline or intervention needed
Oct 22 15:08:58 jd04  printer: error cleared
Oct 24 17:52:27 jd37  printer: powered up
Oct 24 18:28:13 jd37  printer: printer is disconnected
Oct 24 18:37:46 jd07  printer: error cleared
Oct 24 18:38:42 jd37  printer: powered up
Oct 25 07:50:16 jd04  printer: toner/ink low
```

B

HP Jetdirect 802.11b Wireless Print Servers

Introduction

HP Jetdirect wireless print servers are printer accessories that support the IEEE 802.11b standard for a wireless Ethernet local area network (WLAN). It uses radio signals to communicate with other WLAN devices or computers. The IEEE 802.11b standard defines the radio frequencies, communication protocols and data formatting required for devices to communicate. When you use an HP Jetdirect wireless print server to connect your printer to your network, you can improve the location flexibility of the printer (compared to a wired network connection), and you can save on network cabling costs.

HP Jetdirect wireless print servers can typically be used at distances of up to 100 meters or more when the signal path is free of obstructions and interference. WLAN radio signals can penetrate many indoor structures and can reflect around obstacles. Wireless communication performance depends on a variety of factors, including the number of users, the quality and physical placement of the wireless hardware, and the sources of radio signal interference (for example, microwave ovens and cordless telephones use similar frequencies). In general, wireless data transfer rates decrease with increasing distance, obstructions, and interference. In most cases, the use of antennas will improve the quality and performance of wireless communications.

Note Because it can be flexibly positioned and includes an internal antenna, the HP Jetdirect 380X wireless print server does not support connection of an external antenna.

Basic HP Jetdirect Wireless Concepts

To assist in your installation of the HP Jetdirect wireless print servers on an IEEE 802.11b wireless LAN, this section provides an overview of some basic concepts that you may find helpful. For more information, refer to the documentation provided with your computer's wireless network interface card or with your Access Point, and to the IEEE 802.11b standards and related sources.

WLAN Communication Mode Topologies

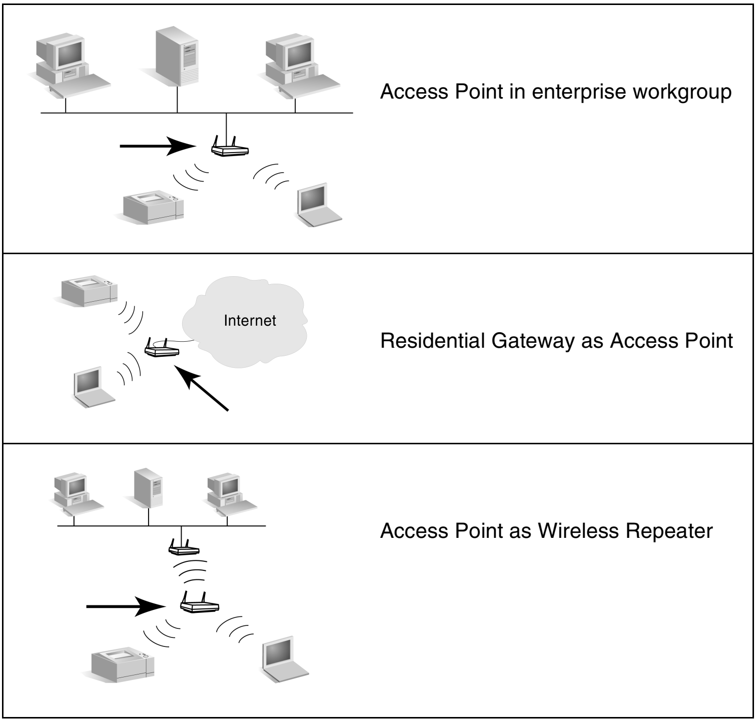
There are two basic wireless networking topologies: Infrastructure Mode and Ad Hoc (Peer-to-Peer) Mode.

Infrastructure Mode

In Infrastructure Mode, all wireless communications from a network device go through an Access Point. See Figure B.1. Infrastructure Mode is referred to as a Basic Service Set (BSS). It is sometimes called a "star topology", and even "enterprise mode" because it is the preferred topology for large networks.

An Access Point is a network component that acts as a network hub, bridge, or gateway to connect wireless devices to a wired network. In some cases, an Access Point may be used as a simple repeater to extend the range between wireless network devices. Because all wireless traffic in Infrastructure Mode must go through an Access Point, a key function is its ability to route traffic to all devices on a network.

Figure B.1 Infrastructure Mode Examples



Some devices may be named for their basic function, but may also provide Access Point services. For example, a Residential Gateway may provide Access Point wireless functions while connecting devices to an enterprise intranet, or the Internet, through a telephone or broadband connection. However, to be used as an Access Point on an Infrastructure Mode network, a device must be able to receive and forward network traffic to all other wireless devices on the network. For Access Point features, see your vendor's documentation.

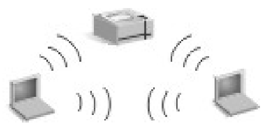
An Access Point has a fixed throughput capacity; therefore, wireless network performance will depend on the number of wireless devices connected and types of data transfers. For example, you may only want to have 10 or 20 power users who transfer large data files, or up to 50 users that have only occasional network communication needs. In addition, the distance between a wireless device and the Access Point will affect performance; longer distances degrade data transmission rates.

You can use multiple Access Points on a network. You can strategically locate and configure your Access Points to create subgroups of wireless users and devices, and allow mobile users (and devices) to roam and connect to different Access Points without losing connection to the network.

Ad Hoc (Peer-to-Peer) Mode

In Ad Hoc (Peer-to-Peer) Mode, the wireless devices on a network communicate directly with each other, and Access Points are not used. Ad Hoc Mode is referred to as an Independent Basic Service Set (IBSS). You may also hear the term "computer-to-computer" mode. See Figure B.2.

Figure B.2 Ad Hoc Mode Example



In Ad Hoc mode, Access Points are not used. All wireless devices may communicate with each other directly.

Note To clarify the use of similar terminology, please note the distinction between wireless "Peer-to-Peer mode" and HP Jetdirect "Peer-to-Peer printing". Wireless Peer-to-Peer mode refers to a topology where wireless devices communicate directly, without routing through an Access Point. HP Jetdirect Peer-to-Peer printing refers to a client's direct print path to a printer, without routing through a network server to a shared printer.

Note that HP Jetdirect Peer-to-Peer printing can be used on either Infrastructure or Ad Hoc (Peer-to-Peer) mode wireless topologies.

Although network performance depends on the types of users and devices, Ad Hoc Mode is typically used on very small networks (for example, up to six wireless users and devices).

Channels

The band of radio signals used for IEEE 802.11b wireless networking are segmented into specific frequencies, or "channels".

For IEEE 802.11b wireless networks, 14 channels are available. But each country/region specifies the channels that are authorized for use. For example, in North America, only channels 1 through 11 are allowed. In Japan, channels 1 through 14 can be used. In Europe, except for France, channels 1 through 13 are allowed. Because of frequent changes to existing standards, you should check with your local regulatory agencies for authorized channel use. Note that, in most countries/regions channels 10 and 11 may be used without restriction.

Channel selection on the HP Jetdirect wireless print server depends on the Communication Mode (or topology) of the network.

- In **Ad Hoc (Peer-to-Peer) Mode**, the HP Jetdirect wireless print server will initially scan all channels for the network specified by the Network Name (SSID), for example `hpsetup`.

  If the specified Ad Hoc network is detected, the print server will configure and use the channel that the network uses.

  If the specified Ad Hoc network is not detected, the print server will actively transmit and advertise itself using a selected channel. By factory default, channel 10 (2457 MHz) will be used. However, channel 11 (2462 MHz) is also available.

  If the print server fails to associate with a network, it will repeatedly scan on all channels and then actively transmit on the selected channel (channels 10 or 11) until it associates with the specified network.

- In **Infrastructure Mode**, the channel will be determined by the Access Point to which the print server connects. The HP Jetdirect print server, as with other clients, will adapt its channel to the one required.

The channels available on your HP Jetdirect wireless print server depend on your print server model. For supported channels, see the documentation included with your HP Jetdirect wireless print server.

Network Access and Data Security

Unlike a wired network which requires a physical connection, wireless networks can be accessed by devices and computers that are in range of the network's radio signals. It is not difficult for an intruder to eavesdrop on wireless network traffic to gain access to the network or observe network data.

To inhibit unauthorized access, authentication and data encryption options for wireless networking are available.

- Authentication is a process in which devices must validate their identity before accessing or communicating on a network.
- Encryption provides data privacy by modifying data frame bits before transmission, and restoring data frame bits when received. The HP Jetdirect wireless print server supports several authentication options and encryption.

Network Name (SSID)

Wireless devices are configured with the name of the network to which they will connect. The Network Name is also called the SSID (Service Set Identifier) and identifies the ESS (Extended Service Set) that is normally associated with larger Infrastructure Mode networks.

The Network Name/SSID should not be considered a security feature because it is usually easily identified. However, as a network administration or management feature, it does provide basic network access control.

HP Jetdirect print servers support a broadcast SSID, sometimes called a zero-length or “blank” SSID. If a blank SSID is configured in Infrastructure mode, the print server will attempt to associate with the network SSIDs detected, starting with the strongest signal. Successful association will be based on encryption and authentication settings.

Authentication

Authentication is used to validate the identification of each device or computer that is attempting to communicate. The authentication method used on a wireless network is decided during network design and is primarily based on network security requirements. Consequently, the authentication method is closely associated with encryption options also used on the network.

The authentication methods supported by the HP Jetdirect wireless print servers include: Open System, Shared Key, EAP/802.1x, and EAP/PSK.

Open System. Open System authentication is used when positive validation of a device's identity is not required for network access. If a device is configured for Open System authentication, then any other device or Access Point can authenticate with it. Open System authentication is the factory-default authentication method configured on HP Jetdirect wireless print servers.

While Open System authentication virtually allows open access to a device, data security can still be implemented for the device using encryption. For more information, see Encryption.

Note If the print server is configured with Open System authentication while the network requires EAP authentication, the Jetdirect configuration page will indicate a Ready status with an Authentication Failed message.

Shared Key. Shared Key authentication is used when a standard level of validation for a device's identity is required before network access is permitted. Shared Key authentication requires that WEP security be implemented on all wireless network devices. In Shared Key authentication, a secret WEP key must be independently configured on each wireless device (that is, the same key is shared by the devices on the network). During the authentication process, a comparison is made between a transmitted challenge and an encrypted and decrypted response. An appropriate match must occur before access is allowed. For information on WEP keys, see WEP Security.

EAP/802.1x. IEEE 802.1x EAP (Extensible Authentication Protocol) is used on networks that use authentication servers, such as a RADIUS (Remote Authentication Dial In User Service, RFC 2138) server, for client authentication on a network. HP Jetdirect 802.11b wireless print servers support popular authentication methods based on EAP, including:

- **LEAP** (Lightweight Extensible Authentication Protocol). LEAP is a Cisco Systems, Inc. proprietary protocol. LEAP requires an EAP User Name and EAP Password. Dynamic encryption keys are also used.
- **PEAP** (Protected Extensible Authentication Protocol). PEAP uses digital certificates for network server authentication and passwords for client authentication. PEAP requires an EAP User Name, EAP Password, and CA Certificate. Dynamic encryption keys are also used.
- **EAP-MD5** (EAP using Message Digest Algorithm 5, RFC 1321). EAP-MD5 uses a password protected by the MD5 encryption algorithm. For MD5, enter an EAP User Name and EAP Password. Static encryption keys are also used.
- **EAP-TLS** (EAP using Transport Layer Security, RFC 2716). EAP-TLS uses X.509-compliant digital certificates for both client and network server authentication. TLS requires an EAP User Name, Jetdirect Certificate, and CA Certificate. Dynamic encryption keys are also used.
- **EAP-TTLS** (EAP using Tunneled Transport Layer Security). EAP-TTLS is an EAP-TLS extension that also uses X.509-compliant digital certificates. TTLS requires an EAP User Name, EAP Password and CA Certificate. Dynamic encryption keys are also used.

As indicated for each EAP/802.1x authentication method, configuration of additional parameters may be necessary.

EAP/PSK. For small office networks that do not have an authentication server, HP Jetdirect wireless print servers support network authentication using Extensible Authentication Protocol with a Pre-shared key (EAP/PSK). Using a pass-phrase entered by the user, the print server generates a pre-shared key used for network access and communications.

When configured for EAP/PSK authentication, the print server uses Wi-Fi Protected Access (WPA) dynamic encryption protocols for wireless communications.

Certificates

Digital certificates are used to validate the identity of network clients and servers and allow encrypted communications. A digital certificate is an electronic message typically containing, among other things, a key (a short string used for encryption and decryption) and a digital signature. Certificates may be issued and signed by a trusted third party (commonly called a Certificate Authority, or CA), which may exist internal or external to the organization. Or certificates may be "self-signed", which is similar to validating your own identity.

To support EAP/PSK and selected EAP/802.1x authentication methods, an HP Jetdirect print server may need to contain one or both of the following certificates:

- **CA Certificate**. A certificate from a trusted Certificate Authority (CA) is used to validate certificate information received from an authentication server. The CA must be the same as that used for the authentication server.
- **Jetdirect Certificate**. A certificate that validates the Jetdirect device to the authentication server must be installed. The Jetdirect certificate may be issued by a trusted Certificate Authority, or may be self-signed, depending on the requirements established by the administrator of the authentication server.

Encryption

HP Jetdirect 802.11b wireless print servers support both static and dynamic encryption protocols.

Static WEP. The IEEE 802.11b standard includes a WEP (Wired Equivalent Privacy) protocol for security. Using a secret key, a WEP algorithm provides data encryption immediately before wireless transmissions, and data decryption when received. While absolute security cannot be guaranteed, WEP security is considered the first significant line of defense against casual eavesdroppers.

For WEP security, the WEP protocols must be implemented on each wireless device on your network. HP Jetdirect wireless print servers support WEP protocols.

WEP security uses a secret key for authentication or data encryption on both the sending and receiving device. If a secret WEP key (analogous to a password value) is used for authentication, it

must be available on all your wireless network devices.

The need for a static WEP key depends on the authentication method used. For Open System authentication (the factory default configuration), a static WEP key can be configured but is not required. For Shared Key or EAP-MD5, a static WEP key must be configured, and it must match the active key on the other wireless network devices.

The HP Jetdirect print server can store up to four static WEP keys, although only one is active at a time. These WEP keys will remain the same (hence, static) until the network administrator changes them.

HP Jetdirect wireless print servers support 40/64-bit and 104/128-bit encryption. When configuring a static 64-bit WEP encryption key, you enter 40 bits of the WEP key. When configuring a static 128-bit WEP encryption key, you enter 104 bits of the WEP key. In both cases, 24 IV (Initialization Vector) bits are automatically added.

The HP Jetdirect wireless print server supports WEP key entry using 8-bit alphanumeric ASCII characters (0 through 9, a through z, A through Z) or 4-bit hexadecimal digits (0 through 9, a through f, A through F). Note that alphanumeric ASCII characters are case-sensitive; entering an upper- or lowercase character will result in different WEP key values. If you use hexadecimal characters, you should ensure that the resulting bit values convert to the allowed set of alphanumeric ASCII characters. This will allow you to enter WEP keys on devices that restrict WEP key entry to alphanumeric ASCII characters only.

For more information on WEP security, contact the Wireless Ethernet Compatibility Alliance (WECA). HP Jetdirect IEEE 802.11b wireless print servers are WECA Wi-Fi certified products. Wi-Fi, the standard for wireless fidelity, is a trademark of WECA.

Dynamic Encryption. Depending on your wireless print server model, the following dynamic encryption protocols are supported:

- dynamic WEP
- Wi-Fi Protected Access (WPA)

When dynamic encryption is used, encryption keys are periodically changed automatically and provide enhanced security.

In dynamic WEP encryption, each device on the wireless network is assigned a different encryption key that expires at preset intervals and is then replaced.

WPA encryption is an enhanced version of dynamic WEP and offers improved security. For example, new encryption keys are generated for fixed amounts of data (10 kilobytes) transmitted by a device on the network.

When configuring HP Jetdirect print servers for dynamic encryption, the following options may be provided if supported by the print server:

- Basic Encryption. This option provides dynamic WEP encryption and may be used when using selected EAP/802.1x authentication methods LEAP, PEAP, EAP-TLS, EAP-TTLS.
- Robust Encryption. This option supports dynamic WPA and WEP encryption. It is used with EAP/PSK authentication, and with selected EAP/802.1x authentication methods PEAP, EAP-TLS, EAP-TTLS. Robust Encryption provides for dynamic WPA and WEP encryption protocols.

If WPA dynamic encryption is not supported by your HP Jetdirect wireless print server, EAP/PSK authentication and Robust Encryption selections will not be available.

Installation Overview

To connect and install a network printer using an HP Jetdirect wireless print server, you must complete these tasks:

- Connect the Print Server Hardware to the Printer
- Configure a Wireless Connection to Your Network
- Install the Printer on Your Network Systems

Connect the Print Server Hardware to the Printer

1. To connect the hardware, use instructions in the documentation provided with the print server.
   - Turn the printer off and insert internal print servers into a compatible I/O slot in the printer. When you turn the printer on, power to the print server will be provided by the printer.
   - For external print servers, connect the print server to the printer using a USB (Universal Serial Bus) cable. For power, connect the print server's power module using an AC power source.
2. To verify that the print server is operating properly, print and inspect a Jetdirect configuration page. Look for the message "I/O Card Ready". In addition, the status of each protocol will be displayed.
   - For internal print servers, a Jetdirect configuration page typically prints along with your Printer's configuration page. Refer to your printer's documentation for control panel or other instructions to print a configuration page.
   - For external print servers, press the **Test** button (✓) on the back of the print server.

Note Configuration page messages are described in Chapter 9.

Configure a Wireless Connection to Your Network

To be able to communicate on your network, the HP Jetdirect print server must have a wireless connection to your network. To set up the print server with a wireless connection, you must first configure it with wireless settings for your network. But before you can configure a new print server, you must be able to communicate with it. To do this, you need a wireless computer (typically a laptop PC that contains an appropriate wireless network interface card) that is that is properly configured. HP-supplied utilities for configuring the print server may attempt to automatically reconfigure your wireless computer for initial communications. But if the utilities are not successful, you will need to reconfigure your computer manually.

Before You Begin...

Before you begin to configure a wireless connection, you should do the following:

- Verify that the HP Jetdirect wireless print server hardware has been installed and is operating properly.
- Verify that the printer and HP Jetdirect print server are powered on.
- Print a Jetdirect configuration page and verify that the print server is ready. Some of the network configuration values displayed on this page may be needed later.
- If necessary, obtain the wireless configuration parameters for your network from your Network Administrator.

Note An HP Jetdirect wireless print server with factory-default settings (Ad Hoc mode) may be easily accessed by unauthorized clients. Therefore, it should not be powered on with factory-default settings longer than necessary, and any configuration changes that you make should be verified.

To Set Up Your Wireless Computer for Jetdirect Communications

To initially communicate with your new HP Jetdirect wireless print server, you may need to do the following:

1. Run your wireless client manager or wireless NIC configuration utility.
2. Change your computer's wireless network settings to match the factory default settings on the Jetdirect print server:
   - Communication Mode: Ad Hoc (peer-to-peer)
   - Network Name (SSID): hpsetup
   - Encryption: <disabled>

Note In most cases, you will not need to change the wireless communication channel on your computer. After you have changed the specified wireless settings on your computer, the print server will automatically adapt its channel to the one used by your computer.

3. Proceed to To Configure the Jetdirect Print Server for Your Network.

To Configure the Jetdirect Print Server for Your Network

To configure the Jetdirect print server's wireless settings to match your network, using one of the following methods:

- Using the HP Jetdirect Wireless Setup Wizard (Windows)
- HP WPS Assistant (Mac OS X 10.1.5 or later)
- Using Your Web Browser (Windows and Mac OS)

Using the HP Jetdirect Wireless Setup Wizard (Windows). To use the HP Jetdirect Wireless Setup wizard, your wireless computer must be running one of the following operating systems: Microsoft Windows 98, Me, NT 4.0, 2000, XP, Server 2003.

Note The HP Jetdirect Wireless Setup Wizard is distributed on the HP Jetdirect CD-ROM, which is included with standalone HP Jetdirect wireless print servers, and may be downloaded from HP online support at:

http://www.hp.com/support/net_printing

1. Run the wizard and follow the instructions on the screen.

   After your wireless computer is configured to match the factory-default settings on the print server, the wizard will search for available printers. Communication with the print server is established when the wizard can find and list your printer.

2. Select your printer and continue.

   Through a series of screens, the HP Jetdirect Wireless Setup wizard will systematically prompt you for the following wireless settings:

   - Communication Mode (or wireless network topology)
   - Channel (Ad Hoc Mode only)
   - Network Name (SSID)
   - Authentication method
   - Static or dynamic encryption selections for your network

3. In the **Confirm Wireless Settings** screen, verify your settings. If necessary, click **TCP/IP Settings** to set your IP address. Some networks may require presetting TCP/IP parameters for network access (for example, to accommodate special DHCP requirements or Access List restrictions).
4. When your HP Jetdirect print server has been configured with your wireless network settings, click **Finish**.
5. Verify that your printer can communicate on your network. See To Verify the Wireless Network Connection.

   Be sure to reconfigure your wireless computer so that it can regain access to your network. To install the printer on your wireless computer, see Install the Printer on Your Network Systems.

HP WPS Assistant (Mac OS X 10.1.5 or later). This utility allows you to configure an HP Jetdirect wireless print server with a connection to your Mac OS network.

To use this utility, the HP Jetdirect wireless print server must be in a factory-default state. Proceed as follows:

1. Insert the CD-ROM into your Mac OS system.
2. Select and open the **HPJETDIRECT** CD-ROM icon.
3. If provided, read the release notes for updated information.
4. Select and open the **HP WPS Assistant** folder.
5. Run the HP WPS Assistant utility, then follow the instructions on the screen.

Once a wireless connection has been created, you will need to use other utilities (such as the HP LaserJet Utility for Mac OS) to configure and manage your printer for printing.

Note Optionally, you may use the embedded Web server to configure a network connection. See Chapter 4.

Using Your Web Browser (Windows and Mac OS). To use your Web browser to configure the Jetdirect wireless print server with a wireless connection to your network, your system must be set up for operation on a TCP/IP network.

Web browser wireless connection instructions are provided for the following systems: Microsoft Windows, and Apple Macintosh (see page 270).

- **Microsoft Windows.** To use your Web browser on a Windows system, follow these steps:

1. Verify that your computer's wireless network settings match the factory-default settings on the HP Jetdirect print server.
2. Open a DOS Command Prompt window.
3. At the command prompt, enter `ipconfig`. The `ipconfig` command will display the computer's IP address. Record this address.
4. Use a "`route add`" command to establish an IP path (or route) from your wireless computer to the print server. (This means that there must be a match between the network identification of your system to that of the HP Jetdirect print server. If the print server is configured with its default IP address, for example 169.254/16 or 192.0.0.192, a route may not exist.)

Note A typical `route add` command is entered as follows:

```
route add <Jetdirect IP Address>   <system IP Address>
```

where `<Jetdirect IP address>` is the IP address on the HP Jetdirect print server, and `<system IP address>` is the IP address set on the computer's network card.

Example:

```
route add 192.0.0.192    192.170.1.2
```

5. Open your Web browser and enter the IP address set on the HP Jetdirect print server as the URL. Communication with the print server is established when the Jetdirect print server's embedded Web pages are displayed.

Note If the Jetdirect embedded Web pages fail to display, try disabling the Web proxy server if your computer's Web browser is configured to use one.

6. In the Jetdirect embedded Web pages, select the **Networking** tab. On the Network Settings page, select the **802.11b** tab.
7. Set the appropriate 802.11b wireless settings for your network using the selections displayed, or by clicking the **Wizard** button:
   - Communication Mode (or wireless network topology)
   - Channel (Ad Hoc Mode only)
   - Network Name (SSID)
   - Authentication method
   - Static or dynamic encryption selections for your network
8. If your network requires IP configuration parameters for network access (for example, due to DHCP or Host Access List IP address restrictions), you should set those parameters now. On the 802.11b configuration page, you can configure the following TCP/IP settings:
   - IP Configuration Method
   - IP address
   - Subnet Mask
   - Default Gateway

   If you change the IP address and click **Apply**, you may lose communications with the print server. To reconnect, use the new IP address.
9. When your HP Jetdirect print server has been configured with your wireless network settings, click **Apply**.

   Once you have changed the print server's settings, your system may lose communications with the print server.

10. Verify that your printer can communicate on your network. See To Verify the Wireless Network Connection.

    Be sure to reconfigure your wireless computer so that it can regain access to your network. Be sure to restore your Web browser's use of proxies, if required.

    To install the printer on your wireless computer, see Install the Printer on Your Network Systems.

- **Apple Macintosh** You can use your Web browser on an Apple Macintosh system (Mac OS 9, Mac OS X) to configure the Jetdirect wireless print server with a wireless connection to your network. Follow these steps:

Note Be sure to read "Before You Begin..." before proceeding.

Note To communicate with the Jetdirect print server through a Web browser, your system will require temporary TCP/IP networking settings (such as an IP address). For information on TCP/IP networking, see Appendix A.

1. Inspect your HP Jetdirect configuration page (see page 263) and verify that your computer's wireless network settings match the factory-default wireless settings on the HP Jetdirect print server.
2. Select the `hpsetup` network in the **Apple AirPort** menu.
    a. Verify that Apple AirPort is turned on.
    b. To display the menu, select the **Apple AirPort** icon in the control strip (Mac OS 9) or the menu bar (Mac OS X)
    c. Select the `hpsetup` network listed under **Computer-to-Computer** (Ad Hoc) networks.

Note **Recommendation**: Before proceeding with the next step, you should record your system's current TCP/IP settings to be safe. If your network uses TCP/IP and you accidentally lose your settings, you will need to restore your TCP/IP configuration after you have set up the HP Jetdirect print server.

3. If necessary, change the computer's IP address so that it is on the same IP subnet as the HP Jetdirect print server. For example, if the default IP address of the print server is 192.0.0.192, you could use 192.0.0.193 on the computer.

   - Mac OS 9:

     a. In the **Apple** menu, select **Control Panels** and then **TCP/IP**.

        To record your current TCP/IP configuration, and to work from a duplicate configuration, follow these steps:

        - In the **File** menu, select **Configurations** and then **Duplicate**. Note the name of the current configuration.
        - Enter a name for a new duplicate configuration.
        - Select **Make Active**.

     b. Select to configure TCP/IP **Manually**, and enter an IP address that matches the IP subnet of the print server. For example, if the default IP address of the print server is 192.0.0.192, then you could configure your computer with an IP address 192.0.0.193 and a subnet mask of 255.255.0.0.

     c. Disable the use of Web proxy servers.

        To create a new Web proxy configuration with proxies disabled and to save your existing configuration, proceed as follows:

        - In the **Apple** menu, select **Control Panels** and then **Internet**.
        - In the **File** menu, select **Duplicate Set** and then **Duplicate**. Note the name of the current configuration.
        - Enter a new name for a new proxy configuration.

- Select the **Advanced** tab and the **Firewalls** icon. Clear all proxy checkboxes so that proxies are disabled.
- Apply your new proxy server configuration.

■ Mac OS X :

a. In the **Apple** menu, select **Location** and then **Network Settings**.

b. Using the Location selector, select **New Location**. Enter a name for the new location, for example "HP Setup". Then click **OK**.

c. When prompted, select **AirPort** as your preferred network. Be sure that AirPort is the only network selected.

   To ensure AirPort is selected, either disable other network ports, or ensure AirPort is the first interface activated for this location.

   - Select **Active Network Ports** and then **Duplicate**. Note the name of the current configuration.
   - Either clear the checkboxes for configuration ports of other networks, or drag-and-drop AirPort to the top of the list.
   - Click **Apply Now**.

d. Click the **TCP/IP** tab. Select to configure TCP/IP **Manually**. Enter an IP address that matches the IP subnet of the print server. For example, if the default IP address of the print server is 192.0.0.192, then you could configure your computer with an IP address 192.0.0.193, a subnet mask of 255.255.0.0, and a Router address 192.0.0.193. Then click **Apply Now**.

e. Click the **Proxies** tab, and clear all proxy checkboxes to ensure proxies are not used. Then click **Apply Now**.

f. Click the **AirPort** tab, and enter `hpsetup` as the **Preferred Network**, to match the Network Name (SSID) of the Jetdirect print server. Then click **Apply Now**.

4. Open your Web browser and enter the IP address of the HP Jetdirect print server as the URL. Communication with the print server is established when the Jetdirect print server's embedded Web pages are displayed.

Note If the Jetdirect embedded Web pages fail to display, verify that the use of a Web proxy server is disabled. See your Web browser help for instructions.

5. In the Jetdirect embedded Web pages, select the **Networking** tab. On the **Network Settings** page, select the **802.11b** tab.
6. Set the appropriate 802.11b wireless settings for your network:
   - Communication Mode (or wireless network topology)
   - Channel (Ad Hoc Mode only)
   - Network Name (SSID)
   - Authentication method
   - Static or dynamic encryption selections for your network
7. If your network requires IP configuration parameters for network access (for example, due to DHCP or Host Access List IP address restrictions), you should set those parameters now. On the 802.11b configuration page, you can configure the following TCP/IP settings:
   - IP Configuration Method
   - IP address
   - Subnet Mask
   - Default Gateway

   If you change the IP address and click **Apply**, you may lose communications with the print server. To reconnect, use the new IP address.
8. When your HP Jetdirect print server has been configured with your wireless network settings, click **Apply**.

Note By default, AppleTalk should be enabled (click the **AppleTalk** tab for verification).

9. Verify that your printer can communicate on your network. See To Verify the Wireless Network Connection.

Note Be sure to reconfigure your wireless computer to its original settings so that it can regain access to your network. Be sure to restore your original network port settings, TCP/IP parameters and Web browser's use of proxies, if required.

To install the printer on your wireless computer or other network system, see Install the Printer on Your Network Systems.

To Verify the Wireless Network Connection

When you have configured the HP Jetdirect print server with a wireless connection to your network, your network computers should be able to communicate with the printer. If so, you can then use printer installation software to install the printer on each system that will send print jobs directly to the printer.

Note To install the printer on the wireless computer that you used to configure the Jetdirect wireless print server, you must restore your computer's network settings to regain access to your network. If your computer requires special settings from the network (for example, from a DHCP configuration server), you may need to wait a few minutes before your computer can access your network.

To verify that your network systems can communicate with the printer, you can try the following:

- Print a Jetdirect configuration page and check the print server's status. In Infrastructure Mode, a "Ready" message indicates that the print server has found an Access Point, and is authenticated on the network. In addition, signal strength and other parameters will provide an indication that the printer is communicating on the network.
- Send a "ping" command to the HP Jetdirect print server's IP (Internet Protocol) address. The IP address will be listed on the Jetdirect configuration page. If the default IP address 192.0.0.192 is set, it may not be a valid address for your network. In this case, you may need to create an IP path from your

computer to the print server (for example, using your system's "route add" command) before you can use the ping command.

- In your Web browser, enter the IP address configured on the Jetdirect print server as the URL. If the default IP address 192.0.0.192 is set, you may need to first create an IP path to the printer. Communication is verified if the Jetdirect embedded Web pages are displayed.
- Run a printer installation utility on your system and install the printer. For example, the HP Install Network Printer wizard (for Windows systems) will find the printer if it can communicate with it.

Install the Printer on Your Network Systems

To install the printer on your network systems that will print directly to the printer, use your system tools (for example, Windows Add Printer or Macintosh Chooser), or HP-supplied utilities.

HP utilities include the HP Install Network Printer Wizard for Microsoft Windows systems, and the HP LaserJet Utility for Apple Macintosh systems. These utilities are included on the HP Jetdirect CD-ROM and incorporated into printing system utilities supplied with many HP printers.

For additional HP software utilities, see Chapter 2.

C

The HP Jetdirect Control Panel Menu

Introduction

When supported by the printer, HP Jetdirect internal print servers contain a configuration menu that can be accessed from the printer's control panel. The keystrokes to access this menu from the printer control panel depend on the printer. Refer to the printer manuals for more information.

The HP Jetdirect internal print servers support the following printer control panels:

- Classic Control Panel display with menu and parameter selection buttons
- Graphical Control Panel display with navigation and numeric keypads (available on newer HP LaserJet printer models)

Classic Control Panel

Classic control panels can typically display two lines of 16 characters each.

As described in Table C.1, the HP Jetdirect control panel menu allows you to enable or disable network protocols, and configure selected network parameters. On the control panel display, an asterisk (*) is used to identify the selected value.

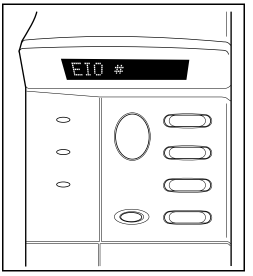


Table C.1 HP Jetdirect Classic Control Panel Menu (1 of 6)

Menu Item	Description
CFG NETWORK=	Selects whether or not you want to access the Jetdirect menu. NO (default): Bypass the HP Jetdirect menu. YES: Access the HP Jetdirect menu. You must change this to YES* each time you want to access the menu.
CFG 802.11B=	(802.11b wireless print servers only) Selects whether or not you want to access the 802.11b configuration menu. NO (default): Bypass the menu. YES: Access the menu. You must change this to YES* each time you want to access the menu. If YES* is selected, the following items may be configured: Note: Most classic control panels display uppercase characters only. To indicate case, the symbol "+" (for uppercase) or "-" (for lowercase) will appear after each character during character entry. MODE: Choose one of the following wireless topologies: ■ AD HOC (default) ■ INFRA. (Infrastructure Mode)

Table C.1 HP Jetdirect Classic Control Panel Menu (2 of 6)

Menu Item	Description
	SSID: Choose one of the following selections: ■ hpsetup (default): This is the factory-default setting. It may be displayed in uppercase characters on most control panels, but is actually lowercase. ■ <List of SSIDs>: Select from a list of SSIDs detected by the print server. ■ <AUTO>: The print server will automatically detect SSIDs and attempt to connect and authenticate on a network, starting with the SSID network with the best signal strength. ■ <CUSTOM> to enter a new SSID. CFG SSID: This item appears if SSID=<CUSTOM> was set. At the SSID= prompt, enter a custom SSID, one character at a time. This SSID will be added to the SSID list. If you subsequently enter a new SSID, it will overwrite the existing custom SSID.
	AUTH.: Choose one of the following authentication methods for your network: ■ OPEN (default) to select Open System ■ SHARED to select Shared Key ■ EAP to select among supported IEEE 802.1x Extensible Authentication Protocol (EAP) options that use an authentication server. See the CFG EAP menu. ■ PSK to select Extensible Authentication Protocol (EAP) using a Pre-Shared Key (PSK) on networks where an authentication server is not used. See the CFG PSK menu.
	CFG PSK: This item appears if AUTH.=PSK was set. Choose one of the following and select it: NO (default): Bypass PSK configuration. YES: Continue with PSK configuration. Enter a network pass-phrase that will be used to generate the Pre-Shared Key for EAP authentication on your network. At the PHRASE= prompt, enter a pass-phrase one character at a time. A pass-phrase must be from 8 to 63 ASCII characters in the hexadecimal range 21 through 7E (characters 0-9, a-z, A-Z and numerous special characters including !, @, #, $, %, ^, &, (,), _, +, =, -, {, }, [,], \, /, “, <, >, ?, “, ‘, ~).

Table C.1 HP Jetdirect Classic Control Panel Menu (3 of 6)

Menu Item	Description
	CFG EAP: This item appears if AUTH.=EAP was set. Choose one of the following: NO (default): Bypass EAP configuration. YES: Enable (ON) or disable (OFF) the EAP protocol used on your network. If an EAP protocol includes requirements that have not been preconfigured on the print server (such as a User Name, Password, Jetdirect certificate for the device, or CA certificate for the authentication server), the EAP protocol will not appear. The following EAP protocols can be enabled: ■ LEAP ■ PEAP ■ EAP-MD5 ■ EAP-TLS ■ EAP-TTLS You may enable multiple protocols simultaneously if required by your network. However, each enabled protocol may require additional configuration.
	DYNAMIC: This item appears if you selected an authentication method for a wireless print server that supports dynamic encryption. Select an available option: BASIC: Dynamic WEP encryption is supported. ROBUST: Dynamic Wi-Fi Protected Access (WPA) and WEP encryption protocols are supported. When configured for EAP/PSK authentication, the print server uses Robust encryption (WPA encryption protocols). When configured for EAP/802.1x authentication (LEAP, PEAP, TLS, TTLS only), the print server may be configured with either Basic encryption or Robust encryption depending on your network. Dynamic encryption protocols are under the control of the authentication server and also must be supported by the Access Point.

Table C.1 HP Jetdirect Classic Control Panel Menu (4 of 6)

Menu Item	Description
	ENCRYPT: For static WEP encryption, this item appears if AUTH.=OPEN (Open System), AUTH.=SHARED (Shared Key), or EAP-MD5=ON. Choose an encryption level: ■ 128 for 104/128-bit encryption ■ 64 for 40/64-bit encryption ■ NONE (default). TX KEY: This item appears if you selected 128- or 64-bit encryption and is used to specify the active transmit key. Choose one of the transmit encryption key positions (key 1, 2, 3, or 4). The selected transmit key must have a valid WEP key value assigned. If a valid WEP key is not assigned, the first key found with a valid key will be assigned. CFG KEY #: Use this menu to configure key values for up to four key positions (where # identifies the key). NO (default): Bypass configuration of this key. YES: Configure a key value for this key. The format for entering key values is hexadecimal entries with alphanumeric assist. Hexadecimal digits (0 - 9, A - F) are entered one byte (two digits) at a time, and an alphanumeric character for that value will be displayed. For 40/64-bit encryption, enter 5 bytes (10 digits). For 104/128-bit encryption, enter 13 bytes (26 digits).t 802.11B: Choose to keep or reset the 802.11b wireless parameters on the print server. ■ KEEP: Configured parameters are maintained. ■ RESET: Parameters will be reset to factory-default values. Parameter values for other network protocols are not reset. To view the reset values, you must exit and reenter the control panel menu.
TCP/IP= IPX/SPX= DLC/LLC= ATALK=	Identifies whether the protocol stack is enabled or disabled. ON (default): The protocol is enabled. OFF: The protocol is disabled.

Table C.1 HP Jetdirect Classic Control Panel Menu (5 of 6)

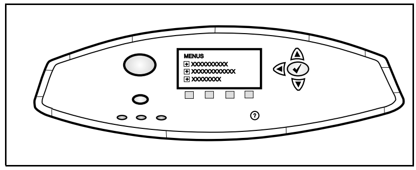
Menu Item	Description
CFG TCP/IP=	Selects whether you want to access the TCP/IP menu and set TCP/IP protocol parameters. NO (default): Bypass the TCP/IP menu items. YES: Access the TCP/IP menu items. ● BOOTP=YES* enables configuration by a BootP Server. ● DHCP=YES* enables configuration by a DHCP Server. If DHCP=YES* and the print server has a DHCP lease, you can choose to configure the following DHCP settings: ■ RELEASE: Choose YES to release, or NO to save, the current DHCP lease. ■ RENEW: Choose YES to renew the current DHCP lease, or NO to not renew the DHCP lease. ● AUTO IP=YES* will automatically assign a link-local address in the form 169.254.x.x. If you specify BOOTP=NO*, DHCP=NO* and AUTO IP=NO*, you can manually set the following TCP/IP parameters from the control panel: ■ Each byte of the IP address (IP) ■ Subnet Mask (SM) ■ Syslog Server (LG) ■ Default Gateway (GW) ■ Idle Timeout period (default is 270 seconds, 0 disables the timeout) ● (620n Only) CFG DNS=YES* will allow you to specify the IP address of a DNS server, one byte at a time. Print a Jetdirect configuration page to verify your settings. However, note that the print server may overwrite selected parameters with values that ensure proper operation.
CFG IPX/SPX=	Selects whether you want to access the IPX/SPX menu and set IPX/SPX protocol parameters. NO (default): Bypass the IPX/SPX menu items. YES: Access the IPX/SPX menu items. In the IPX/SPX menu, you can specify the *Frame Type* parameter used on your network. ■ AUTO (default) will automatically set and limit the frame type to the first one detected. ■ For Ethernet cards, frame type selections include EN_8023, EN_II, EN_8022, EN_SNAP. ■ For Token Ring cards, frame type selections include TR_8022, TR_SNAP. In the IPX/SPX menu for Token Ring cards, you can also specify *NetWare Source Routing* parameters, which include SRC RT=AUTO (default), OFF, SINGLE R, or ALL RT.

Table C.1 HP Jetdirect Classic Control Panel Menu (6 of 6)

Menu Item	Description
CFG LINK=	(10/100Base-TX print servers only) Selects whether you want to manually configure the HP Jetdirect print server's network link. NO (default): Bypass the link configuration menu items. YES: Access the link configuration menu items.
	For 10/100Base-TX networks, the link speed and communication mode must match the network. One of the following link configurations can be set: AUTO (default): The print server will automatically configure itself to match the network's link speed and communication mode. If it fails, 100TX Half will be set. 10T HALF: 10Mbps, half-duplex operation 10T FULL: 10 Mbps, full-duplex operation 100TX HALF: 100 Mbps, half-duplex operation 100TX FULL: 100 Mbps, full-duplex operation
WEB=	For configuration management, specify whether the embedded Web server will accept communications using HTTPS (Secure HTTP) only, or both HTTP and HTTPS. HTTPS: For secure, encrypted communications, only HTTPS access is accepted. The print server will appear as a secure site. HTTP/HTTPS: Access using either HTTP or HTTPS is permitted.
SECURITY=	Specify whether the current security settings on the print server will be saved or reset to factory defaults. KEEP (default): The current security settings are maintained. RESET: Security settings are reset to factory defaults.

Graphical Control Panel

Graphical control panels typically display 18 characters on a line, and as many as four lines at a time. In addition, scrolling may be supported to allow display of additional lines.



On graphical control panels, a numeric keypad and navigation buttons are used to access HP Jetdirect menu items. For a description of menu items and options, see Table C.2.

Table C.2 HP Jetdirect Graphical Control Panel Menu (1 of 7)

Menu Item	Options	Description of settings
802.11b	MODE	Choose one of the following wireless topologies: ■ AD HOC (default) ■ INFRASTRUCTURE
	NETWORK NAME	Specify a Network Name (SSID). Choose a selection below: hpsetup (default): The factory-default SSID typically used for initial configuration. <AUTO>: The print server will automatically detect SSIDs and attempt to connect and authenticate on a network, starting with the SSID network with the best signal strength. <list of Network Names>: The available SSIDs detected by the print server. <CUSTOM>: Use the CUSTOM NAME menu to enter a custom SSID.
	CUSTOM NAME	Enter up to 32 characters for a custom Network Name (SSID). If you subsequently enter a new custom SSID, it will overwrite the existing custom SSID.

Table C.2 HP Jetdirect Graphical Control Panel Menu (2 of 7)

Menu Item	Options	Description of settings
	AUTHENTICATION	Choose one of the following authentication methods for your network: OPEN SYSTEM: Network authentication is not required or used. SHARED KEY: Requires a WEP encryption key on each device on your wireless network. Use the CONFIGURE KEYS menu to configure WEP encryption keys. EAP/802.1x: Requires configuration of Extensible Authentication Protocols in combination with an authentication server used on your network. Use the CONFIGURE EAP menu to configure EAP protocols. EAP/802.1x configuration options may require a password, which may be set using the Security menu. EAP/PSK: Requires configuration of a Pre-Shared Key when Extensible Authentication Protocols are used without an authentication server on the network. Use the CONFIGURE PSK menu to generate a Pre-Shared Key.
	CONFIGURE EAP	This menu is available if EAP Authentication has been selected. The following authentication protocols can be enabled: ■ LEAP ■ PEAP ■ EAP-MD5 ■ EAP-TLS ■ EAP-TTLS You may enable multiple protocols simultaneously if required by your network. However, each protocol enabled may require additional configuration. For each authentication protocol, the following options are available: OFF (default): Disabled ON: Enabled For PEAP, EAP-TLS, EAP-TTLS, “CERT. REQUIRED” may appear, indicating that digital certificate information must be preinstalled on the print server.

Table C.2 HP Jetdirect Graphical Control Panel Menu (3 of 7)

Menu Item	Options	Description of settings
	SECURITY	This menu is displayed only if EAP Authentication has been selected. Set the following parameters: USER NAME: Enter a User Name for the device. Up to 64 characters of text may be entered. PASSWORD: Enter a Password for the device. Up to 64 characters of text may be entered. DYNAMIC KEYS: This item appears if you selected an authentication method for a wireless print server that supports dynamic encryption. Select an available option: BASIC: Dynamic WEP encryption is supported. ROBUST: Dynamic Wi-Fi Protected Access (WPA) and WEP encryption protocols are supported. When configured for EAP/PSK authentication, the print server uses Robust encryption (WPA encryption protocols). When configured for EAP/802.1x authentication (LEAP, PEAP, TLS, TTLS only), the print server may be configured with either Basic encryption or Robust encryption depending on your network. Dynamic encryption protocols are under the control of the authentication server and also must be supported by the Access Point.
	CONFIGURE PSK	PASS-PHRASE: Enter a network pass-phrase that will be used to generate the Pre-Shared Key for EAP authentication on your network. A pass-phrase must be from 8 to 63 ASCII characters in the hexadecimal range 21 through 7E (characters 0-9, a-z, A-Z and numerous special characters including !, @, #, $, %, ^, &, (,), _, +, =, -, {, }, [,], \, /, “, <, >, ?, “, ‘, ~).

Table C.2 HP Jetdirect Graphical Control Panel Menu (4 of 7)

Menu Item	Options	Description of settings
	ENCRYPTION	This menu is displayed if you selected Open System, Shared Key, or EAP-MD5 authentication. Choose your static WEP key encryption level: 128-BIT WEP: Selects 104/128-bit WEP. 64-BIT WEP: Selects 40/64-bit WEP. NONE: (default) indicates that encryption is not configured. WEP encryption keys are configured using the CONFIGURE KEYS menu.
	CONFIGURE KEYS	This menu appears only if 128-bit WEP or 64-bit WEP are selected. Use this menu to assign the transmit key position and WEP key values. Four key positions (key 1, 2, 3, or 4) are available, but the selected key must contain a valid WEP key value. If a valid WEP key is not assigned, the first key found with a valid key will be assigned. TRANSMIT KEY: Select the active transmit key position (key 1, 2, 3, 4). ENTRY METHOD: Select the format for entering WEP key values. ■ HEX: Enter values using hexadecimal numbers (0 - 9, a - f, or A - F). ■ ALPHANUMERIC: Enter values using the allowed alphanumeric ASCII characters (0 - 9, a - z, A - Z). KEY 1 through KEY 4: Enter a valid WEP key value for each key position. ■ For hexadecimal entries, you must enter 10 digits (for 40/64-bit encryption) or 26 digits (for 104/128-bit encryption). Hex digits are not case-sensitive. ■ For alphanumeric entries, enter 5 characters (for 40/64-bit encryption) or 13 characters (for 104/128-bit encryption). Alphanumeric entries are case-sensitive.
	RESET 802.11b	YES: Choose to reset the 802.11b wireless parameters on the print server to factory-default values. Parameter values for other network protocols are not reset. To view reset values, you must exit and re-enter the control panel menu. NO (default): 802.11b wireless parameters are not reset.

Table C.2 HP Jetdirect Graphical Control Panel Menu (5 of 7)

Menu Item	Options	Description of settings
TCP/IP	ENABLE	ON: Enable the TCP/IP protocol OFF: Disable the TCP/IP protocol
	HOST NAME	An alphanumeric string, up to 32 characters, used to identify the device. This name is listed on the Jetdirect configuration page. The default host name is NPIxxxxxx, where xxxxxx is the last six digits of the LAN hardware (MAC) address.
	CONFIG METHOD	Specifies the method that TCP/IP parameters will be configured on the Jetdirect print server. ● BOOTP: Use BootP (Bootstrap Protocol) for automatic configuration from a BootP server. ● DHCP: Use DHCP (Dynamic Host Configuration Protocol) for automatic configuration from a DHCP server. If selected and a DHCP lease exists, DHCP RELEASE and DHCP RENEW menus will be available to set DHCP lease options. ● AUTO IP: Use automatic link-local IP addressing. An address in the form 169.254.x.x will be automatically assigned. ● MANUAL: Use the MANUAL SETTINGS menu to configure TCP/IP parameters.
	DHCP RELEASE	This menu appears if CONFIG METHOD was set to DHCP and a DHCP lease for the print server exists. ● NO (default): The current DHCP lease is saved. ● YES: The current DHCP lease along with the leased IP address are released.
	DHCP RENEW	This menu appears if CONFIG METHOD was set to DHCP and a DHCP lease for the print server exists. ● NO (default): The print server does not request to renew the DHCP lease. ● YES: The print server requests to renew the current DHCP lease.

Table C.2 HP Jetdirect Graphical Control Panel Menu (6 of 7)

Menu Item	Options	Description of settings
	MANUAL SETTINGS	(Available only if CONFIG METHOD is set to MANUAL) Configure parameters directly from the printer control panel: ● IP ADDRESS n.n.n.n: The unique IP address of the printer, where n is a value from 0 to 255. ● SUBNET MASK m.m.m.m: The subnet mask for the printer, where m is a value from 0 to 255. ● SYSLOG SERVER n.n.n.n: The IP address of the syslog server used to receive and log syslog messages. ● DEFAULT GATEWAY n.n.n.n: The IP address of the gateway or router used for communications with other networks. ● IDLE TIMEOUT: The time period, in seconds, after which an idle TCP print data connection is closed (default is 270 seconds, 0 disables the timeout).
	DNS SERVER	(620n Only) Specify the IP address (n.n.n.n) of the DNS Server.
IPX/SPX	ENABLE	ON: Enable the IPX/SPX protocol OFF: Disable the IPX/SPX protocol
	FRAME TYPE	Selects the frame type setting for your network. AUTO (default): Automatically sets and limits the frame type to the first one detected. EN_8023, EN_II, EN_8022, EN_SNAP: Frame type selections for Ethernet networks. TR_8022, TR_SNAP: Frame type selections for Token Ring networks.
	SOURCE ROUTING	(Token Ring only) Specify the *NetWare Source Routing* parameter AUTO (default): The type of source routing required on the network is automatically sensed OFF: All packets are sent without source routing, and only packets from the same ring are received. ALL ROUTES and SINGLE ROUTES: All packets are sent with source routing (broadcasts, and when the route is unknown)

Table C.2 HP Jetdirect Graphical Control Panel Menu (7 of 7)

Menu Item	Options	Description of settings
ATALK	ENABLE	(Ethernet/Fast Ethernet only) ON: Enable the AppleTalk protocol OFF: Disable the AppleTalk protocol
DLC/LLC	ENABLE	ON: Enable the DLC/LLC protocol OFF: Disable the DLC/LLC protocol
SECURE WEB		For configuration management, specify whether the embedded Web server will accept communications using HTTPS (Secure HTTP) only, or both HTTP and HTTPS. HTTPS REQUIRED: For secure, encrypted communications, only HTTPS access is accepted. The print server will appear as a secure site. HTTPS OPTIONAL: Access using either HTTP or HTTPS is permitted.
RESET SECURITY		Specify whether the current security settings on the print server will be saved or reset to factory defaults. NO (default): The current security settings are maintained. YES: Security settings are reset to factory defaults.
LINK SPEED		(10/100Base-TX print servers only) Selects the network link speed and communication mode for the 10/100TX print server. For proper communications, the Jetdirect settings must match the network. AUTO: (Default) The print server will automatically configure itself to match the network's link speed and communication mode. If it fails, 100TX HALF is set. 10T HALF: 10Mbps, half-duplex operation. 10T FULL: 10 Mbps, full-duplex operation. 100TX HALF: 100 Mbps, half-duplex operation 100TX FULL: 100 Mbps, full-duplex operation

D

OpenSSL Statements

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